Outbreak report

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Brucellosis outbreak due to unpasteurized raw goat cheese in Andalucía (Spain), January - March 2002

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« Previous Article | Table of Contents | Next Article »

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Eleven brucellosis cases were identified in three municipalities of Cordoba (Andalucía, Spain). A case-control study was conducted, selecting three cases per control. Persons having eaten unpasteurized raw goat cheese produced in a farmhouse located in the epidemic territory, were at higher risk for presenting brucellosis (OR=21.6, IC95%=1.6-639.8). Brucella melitensis serovar 3 was identified in clinical specimens and in goat tissue and milk samples from the herd's farmhouse. Preventive measures were implemented and the outbreak was stopped after the withdrawal of all suspicious cheeses from the market, additional sanitation of the farmhouse and health promotion activities.

Introduction

Brucellosis, transmitted to man from sheep and goats (Brucella melitensis), has been eliminated from most developed countries. Nonetheless, in Spain brucellosis is still the most common zoonoses, even though the annual incidence rate has been steadily decreasing since 1984, from 20 cases per 100 000 inhabitants until 2.34 in the year 2001. Historically, Extremadura and Andalucía are the regions with the highest incidence: 7.17 and 6.06 respectively in the year 2001 (1,2). In these regions, there are two distinct modes of transmission:
•Direct transmission due to occupational exposure usually in rural areas;
•Foodborne transmission in urban or periurban areas.

Alert

In Andalusia, brucellosis is a disease of mandatory individual notification. The Alert Network in Public Health must urgently notify all outbreaks.
From January to March 2002, four suspicious cases of brucellosis were notified to the district health service in Cordoba (Andalucía, Spain). Cases lived in three close rural municipalities: Lucena, Benamejí and Palenciana.

Method

An epidemiological investigation was conducted in both municipalities to identify vehicle and source of infection, to describe the circumstances of the outbreak and to establish control measures. Firstly, active search of cases was established by interviewing all general practitioners of health centres in the affected areas. The preventive medicine and internal medicine services of the reference hospital were also interviewed and alerted. A protocol to identify asymptomatic cases among people exposed to the suspicious cheeses was established in coordination with the reference laboratory.
Simultaneously, an initial descriptive study was conducted and preventive measures implemented. Secondly, based on these preliminary results a case-control study was designed. At least three controls per case were randomly selected among companions of outpatients visiting the health centre, excluding persons with any symptom compatible with brucellosis. Cases and controls were interviewed using a questionnaire validated in a similar outbreak (2).

The definitions used were:
•Suspicious case: a person residing in Lucena, Benamejí or Palenciana presenting clinical symptoms of brucellosis between the 1 January and 31 March 2002, in addition to a positive Rose Bengal test or a agglutination test titre >1/160.
•Confirmed case: a suspicious case with positive blood culture and/or an increase of antibody titre by STA test (Standard Tube Agglutination) between two samples taken separately at least 15 days apart and analysed in the same laboratory.
•Control: a person residing in the epidemic territory that did not present any clinical brucellosis symptom, and had the same probability of exposure to the risk factors than the cases.

Results

Initial descriptive study

Eleven cases were identified, two confirmed and nine suspect cases. The mean age was 33 (+/-10) years and the most frequent symptoms were: fever (100%), chills (100%), nocturnal perspiration (91%), general malaise (91%), arthralgia (82%), weight loss (64%) and headache (64%). Three cases were hospitalised for a median of four days. A prompt response to antibiotics was seen in all cases, except one that had a Jarisch-Herxheimer reaction. No cases had had brucellosis previously.
The first case presented symptoms on 1 January 2002 and the last on 20 March 2002. In consequence, the outbreak duration was 79 days.
The temporal distribution of cases is showed in Figure 1, where cases belonging to the same family are represented with the same letter.

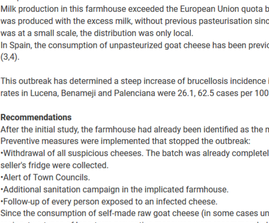
Figure 1
Distribution temporelle des cas par famille / Temporal distribution of cases per family

Cases were aggregated in seven families. Eight cases were resident in Lucena, two cases lived in Benamejí and other in Palenciana. Lucena cases were aggregated in five families but the cases from Benamejí and Palenciana were the only affected members in their families. No aggregation per districts of these villages was found.
The hypothesis of the study was that the outbreak was secondary to the consumption of unpasteurized raw goat cheeses in the municipalities of Lucena, Benamejí and Palenciana from November 2001 to March 2002.

Analytical study

All cases identified were interviewed (n=11), but only one case per family was randomly selected to be included in the analytical study (seven cases). All family members had eaten portions of the same cheese but it was not known whether every cheese had the same origin. By choosing one case per family, over-representation in the data analysis of the cheeses eaten by more people, was avoided. A total of 26 controls were selected and interviewed.
There was no recent or earlier occupational exposure risk animals (mainly goats and sheep) either among cases or controls. Nor was there any previous contact with risk animals and consequently, that was excluded as a possible transmission factor for the outbreak.
Persons having eaten unpasteurized raw goat cheese were at higher risk of presenting with brucellosis than those who did not (OR=37.4 ; IC95%=3.18-2201,1). Even more specifically, the consumption of unpasteurized raw goat cheese produced in a farmhouse located in the epidemic area was also associated with the occurrence of the disease and statistically significant (OR=21.6, IC95%= 1.6-63.8).
The mean incubation period was 59 (+36) days with a median of 49, defined as the time interval from the first exposure date until the onset of symptoms (figure 2).

Figure 2
Durée de l'exposition par lieu de production des fromages infectés / Time of exposure per place of production of the infectious cheese



As the table shows, one case had not eaten unpasteurized raw goat cheese.
Other than the cases, 10 asymptomatic persons were identified as exposed to the suspicious cheeses. Among them, three cases were diagnosed as positive for brucellosis and treated.

Tableau / Table
Résultats de l'étude cas-témoins / Case-control study results

Variables	Cas / Cases	Témoins / Controls	Odds Ratio	Intervalle de confiance 95 % / Confidence Interval 95 %
	Oui / Yes | Non / No	Oui / Yes | Non / No		
Consommation de fromage de chèvre non pasteurisé / Consumption of unpasteurized goat cheese	4 | 1	3 | 23	37.42	3.18 - 2201.17
Consommation de fromage de chèvre non pasteurisé produit à la ferme / Consumption of unpasteurized goat cheese produced in the farmhouse	3 | 4	0 | 26	21.66*	1.60 – 639.84*
Connaissance d'autres personnes ayant acheté du fromage non pasteurisé / Knowledge of persons with other unpasteurized cheese buyers	4 | 3	3 | 23	9.21	1.03 – 163.33

Microbiological and environmental investigations

The last routine sanitation campaign in the implicated farmhouse took place in November 2001. Nineteen goats (all females) were positive to Brucella melitensis. The results were available at the beginning of December 2001, being these animals slaughtered later in the same month. Allegedly, the unpasteurized raw cheeses were produced in the time interval between sampling and diagnosis.
After the results of the analytical study, an extra sanitation campaign was conducted in April 2002 where 26 goats and 2 male goats were positive. These animals were slaughtered in May and several samples (milk and tissue) taken for serotyping.
Brucella melitensis serotype 3 was identified in samples from goats' infected tissue and milk and from the blood specimens from the cases. All samples were serotyped in the same laboratory.

Discussion

An outbreak of brucellosis due to consumption of unpasteurized raw goat cheese occurred in a rural area of Andalucía, Spain. Evidence that the raw goat cheese was the source of the outbreak comes from the results of the case-control study, from the isolation of Brucella belonging to the same serotype in all samples and the fact that no more cases occurred after the implicated butch of unpasteurized cheeses was exhausted.
Two different distribution points of the unpasteurized cheeses has been identified: the farmhouse and a street seller. Most of the cases interviewed implicated the farmhouse as the place where the batch of infectious cheeses was purchased. The results of the study confirm that the brucellosis outbreak was secondary to the consumption of unpasteurized raw goat cheese, produced mainly in a farmhouse, located in the epidemic area.

The farmhouse's herd was probably infected with Brucellosis in October 2001, when the herd size was increased. When the first consequent sanitation campaign took place in November, not all infected goats had already become seropositive for Brucella melitensis.
Milk production in this farmhouse exceeded the European Union quota before the end of the year. Raw goat cheese was produced with the excess milk, without previous pasteurisation since it impairs ripening. Considering production was at a small scale, the distribution was only local.
In Spain, the consumption of unpasteurized goat cheese has been previously associated with brucellosis outbreaks (3,4).

This outbreak has determined a steep increase of brucellosis incidence in Andalusia for the year 2002. The incidence rates in Lucena, Benamejí and Palenciana were 26.1, 62.5 cases per 100 000 inhabitants during the epidemic period.

Recommendations

After the initial study, the following measures had been identified as the most probable source of the infection. Preventive measures were implemented that stopped the outbreak:
•Withdrawal of all suspicious cheeses. The batch was already completely sold out be the remaining contents in the seller's fridge were collected.
•Alert of Town Councils.
•Additional sanitation campaign in the implicated farmhouse.
•Follow-up of every person exposed to an infected cheese.
Since the consumption of self-made raw goat cheese (in some cases unpasteurized) seems to be common in the region, two types of long-term preventive measures were recommended:
•Health promotion activities among producers and consumers to reduce such consumption.
•Implementation of measures to improve communication and information exchange between the human and veterinary surveillance system. They should constantly communicate with the Town Council since this is the competent Authority to implement every measure.

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