

30 Years of Brucellosis in the Republic of Macedonia: Experience with its Prevalence, Prevention and Control

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Abstract

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Aim. To present the epidemiological patterns of brucellosis and to analyse measures for prevention and control of brucellosis in the Republic of Macedonia from 1980 to 2009.

Methods. Epidemiological reports and other documents available on brucellosis patients, as well as other official documents and reports from the veterinary health services, were analysed in relation to the measures and activities for the prevention and control of brucellosis in the Republic of Macedonia in the last 30 years.

Results. During the period from 1980 to 2009, approximately 11,000 human patients were registered, with an annual average of morbidity of 20 per 100,000 inhabitants. The health service directed its preventive measures towards three target groups: the general population, farmers, and those engaged in relevant professions. After the brucellosis outbreak in the Bitola region in 1980, 11000 animals were killed within three years. Herd slaughtering was carried out in cases where more than 20% of the sheep were affected by the disease. Enormous damage was done and the number of infected people rapidly increased. Therefore, an interdepartmental commission was established in order to come up with a Brucellosis Eradication Programme. Unfortunately, the Programme was not implemented properly due to financial problems and several other reasons.

Conclusion. After its outbreak in the Republic of Macedonia in 1980 brucellosis spread all over the country, becoming an endemic disease. The main reason for this fact should be traced to the failure to prepare an appropriate strategy and approach for the efficient prevention and control of brucellosis.

Introduction

Zoonoses are primarily animal diseases which occasionally under certain circumstances affect humans [1]. The risk of possible infection varies in intensity and most often it depends on the disease's prevalence in animals and the nature of the infection. Thus, the primary focus in prevention and control of brucellosis in humans should be on eradication of brucellosis in animals [2, 3].

Eradication and control of brucellosis is difficult and challenging, requiring a long-term strategy and expensive activities which must be guided systematically in order to achieve the expected results. This especially concerns eradication of brucellosis in sheep and goats.

While some countries such as Canada, Australia and Great Britain have succeeded in eradicating brucellosis among cattle with persistent and expensive activities lasting for years, there has not been a single case of

brucellosis eradication in sheep and goats throughout the world [4].

The Republic of Macedonia is an example where the above-mentioned statements have become apparent. This negative experience with the prevention and control of brucellosis produced large economic, health and social problems during this period of about 30 years. Failures in prevention and mistakes made were detracting from the desired model of successful control of brucellosis.

The aim of this paper is to analyse measures for the prevention, control and eradication of brucellosis in the Republic of Macedonia, along with the epidemiological situation, stages, approaches, and activities.

Methods

The epidemiological situation regarding human brucellosis in the Republic of Macedonia during the past 30 years has been gathered through an analysis of the obligatory epidemiological questionnaire filled in by patients. Data about the epizootological situation and measures undertaken for the eradication and control of brucellosis were collected through official documents from the Ministry of Health and Ministry of Agriculture and other documents and published articles.

Results

Epidemiological situation

Although the Republic of Macedonia geographically comes under the Mediterranean Region as an endemic region for brucellosis, until 1980 brucellosis was rarely reported. During the period from 1945 to 1979, a total of 14 brucellosis cases were registered, while the doctors' experience of the diagnosis and treatment of patients with brucellosis was poor and limited. The first outbreak of human brucellosis caused by *Brucella melitensis* in R. Macedonia was reported in 1980. The outbreak was reported in the Bitola region, where 104 cases of brucellosis were registered. The final diagnosis of the disease was delayed for 4 months, during which period patients were treated for other diseases.

In the same year some other municipalities were also affected, i.e. 8 cases were reported in the regions of Kavadarci and Negotino. In the subsequent year, 1981, 112 new cases of brucellosis were registered, all of them

in the Bitola region .

In the next two years the number of those diseased decreased, but the disease spread to other regions and, in the next decade, over the entire territory of the Republic of Macedonia.

In the last 30 years, more than 11,000 people were diagnosed with brucellosis with an average morbidity of 20/100,000 [5]. The most intensive epidemic outbreak of brucellosis took place in the period 1989-1998. The highest number of new cases was recorded in 1992 with 907 new cases, which represents an incidence rate of 44.2/100,000 [5].

Intensive epidemic outbreaks were registered in the municipalities of Radovish and Valandovo. In 1991, in the Radovish region, the incidence peak reached 874.1/100,000 and during this outbreak 6% of the population was affected. In the Valandovo region the incidence in 1990 was 724/100,000 [6].

The rural population was four times more frequently affected and males were affected three times more than females. As high as 50% of all the patients were men from the countryside, while only 7% were women from city regions. Extremely high morbidity with an incidence reaching 20% was recorded in some village regions of the Radovish municipality. The highest incidence was recorded in the villages settled with a Yuruk ethnic population of Turkish origin. The incidence of brucellosis in those villages was several times higher than the incidence among the population living on the remaining territory of the Radovish municipality [5].

Brucellosis is primarily a communicable disease with a high occupational risk for farmers, livestock raisers, butchers, shepherds, veterinarians and laboratory and slaughterhouse workers, as well as for people having close contact with infected animals or animal products [7].

The surveys conducted in two slaughter-houses revealed that the slaughtering of serologically negative animals lead to an absence of infected and sero-positive people. In contrast, 10% of workers in slaughter-houses where testing was not done were seropositive, and some of them were also diseased.

The professional character of brucellosis defines the age-structure of patients, with adult and elderly people being more frequently affected. In most countries most frequently affected the age group is 20-50 years, but in Macedonia the people most frequently infected

were over 50 years of age [8].

This difference arises from the fact that older people are more often involved in cattle raising and animal husbandry in the Republic Macedonia. The least infected were under the age of 10, although the total number of more than 800 in this age-group infected over a period of 30 years is quite large.

In more than 40% of the patients it was difficult to ascertain the precise route of infection. In those where the route of infection was assumed with great confidence, 40% were infected through contact, and 21.5% through an alimentary route [9].

Brucellosis in the Republic of Macedonia had a clearly seasonal occurrence. The highest number of cases was seen during April, May and June. More than half of the patients were infected during these 3 months. This fact mainly depends on the reproductive cycle of sheep.

Counter-epidemic and control measures

Prevention and control of brucellosis are a joint activity of the health and veterinary services. Measures taken by the health services alone are not sufficient, in a lack of poor coordination of veterinary measures, to prevent and provide an adequate decrease in the morbidity of brucellosis.

The epidemiological characteristics of the disease lead to the conclusion that measures for the control of brucellosis should be focussed in three areas: the general population, livestock raisers, and certain professions at risk of infection.

In the early 1980s, the implementation of adequate control measures for the control of brucellosis was ignored by the government due to the non-recognition of the presence of brucellosis in the Republic of Macedonia. Later on these measures were successfully conducted and the population became familiarized with the character of the disease, the routes of infection, and protective measures.

Special attention was paid to the farmers' families through awareness programmes focusing on the symptoms of brucellosis among animals, safe methods of livestock-breeding, how to prepare white cheese safely, and other activities connected with a high risk of infection with brucellosis.

Education of the population and farmers was conducted through leaflets, lectures and dialogues with

people in the affected areas. The awareness programme also focussed on special groups such as butchers, shepherds, curriers, wool workers, etc.

Epizootic situation

The most important measures of prevention and control of brucellosis are veterinary measures aimed at preventing the initiation and spread of the disease into a certain territory or a certain herd. If it happens that a herd becomes infected then appropriate veterinary measures should be undertaken to bring the disease among the animals under control.

Presumptions regarding the possible way of introducing brucellosis into the Republic of Macedonia indicate faults made in undertaking preventive measures. Most probably, brucellosis was imported into the Republic of Macedonia by sheep imported from Israel in 1971. Two thousand five hundred sheep were imported, of which 67 were positive for brucellosis during the quarantine period. An obvious omission was the importing of an infected herd and untested animals. Positively tested animals were killed and the rest of the herd was sold to several farms in the Republic of Macedonia, which was another important omission.

A few years later, in 1975, an increased number of abortions was noted (5-8% yearly) at a military farm close to the town of Negotino. This fact was later on, in 1978, assigned to brucellosis. The same year, brucellosis was confirmed on 3 more farms that sold the sheep to the military farm. In 1979, brucellosis was present in 4 municipalities of the Republic of Macedonia [9].

During the 1970s, brucellosis was present in certain sheep herds in the Republic of Macedonia. Nevertheless, counter-measures to prevent the spread of brucellosis among animals and people were not implemented. In addition, information about the presence of brucellosis was kept secret without informing livestock breeders, doctors, or veterinarians. That was the reason for the 1980 epidemic outbreak when it took more than 4 months to confirm the diagnosis in diseased persons. From January to May 1980, around 40 patients were hospitalised and treated according to different diagnoses. Even after this negative experience, brucellosis was kept quiet, which limited the measures for disease control and prevention.

Because doctors were not informed about the existence of animal brucellosis and not aware of the possibility of the disease affecting people, the diagnosis of many cases of human brucellosis was delayed.

An analysis made in 1987-88 showed that in 50% of those infected with brucellosis the diagnosis was established one month after the disease had started, and in 20-25% of cases the disease was already transformed with a chronic course. Another analysis showed that in 11% of those diseased in the period 1980-1982 recidivisms existed, which is an unusually high percentage.

Counter-epizootic measures

After the brucellosis outbreak in the Bitola region in 1980, the veterinary service started more intensive activities and measures for the eradication of the disease. That year thousands of animals were killed, as whenever brucellosis was registered in a herd all sheep in that herd were slaughtered. However, the effects of the measures undertaken were not satisfactory and the next year the number of infected people rapidly increased, followed by a three-fold rise in the number of infected animals. From the following year, 1981, herd slaughtering was carried out only in cases where more than 20 % of the sheep in a herd were affected by the disease. For a short period of 3 years only, more than 11,000 sheep were killed in the Bitola municipality. Despite the huge economic damage because of slaughtered sheep in the subsequent years, the number of people diseased continued to rise. In the late 1980s, an interdisciplinary commission was formed by the Ministry of Health (Republic Committee of Health and Social Care) of the Republic of Macedonia, which developed a Brucellosis Eradication Programme. Its implementation started in 1988 with the first step to estimate the current status of brucellosis in animals with the intention of examining all the sheep and goats in the Republic of Macedonia during the first 2 years. Only the first year of implementation of the plan was realized and about 50% of the sheep and goats were examined.

Due to lack of financial resources and certain other reasons, the planned activities for the examination of sheep and goats were not fully realized. The main factors influencing the failure of the programme for eradication were:

- Lack of a consistent strategy for brucellosis eradication;
- Failure in implementation of the crucial measures of the programme for eradication;
- Unaffected regions, settlements and herds were not isolated and protected;

- Lack of thorough "cleaning" of affected herds and settlements and their isolation;
- There was no established control of trading and movement of animals and herds, etc.

Due to these reasons, the programme did not yield satisfactory results or, in other words, the programme failed in its implementation and the spread of the disease continued among animals and people. In the early 1990s brucellosis in people reached its maximum for the whole observed period of about 30 years, with 922 cases in 1992 (Figure 1). The Government of the Republic of Macedonia faced a dramatic situation with brucellosis among animals and people and a specific Programme on examining the appearance, prevention and control of brucellosis in humans in the Republic of Macedonia was introduced [10], which is annually adopted and financed by the State Budget through the Ministry of Health and Ministry of Agriculture, Forestry and Water Economy. The aim of the Programme is the prevention and eradication of brucellosis in humans over the territory of the whole country through surveil-

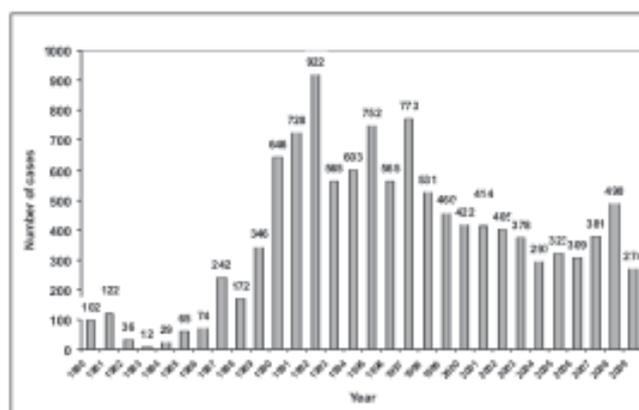


Figure 1: Number of brucellosis cases in the Republic of Macedonia in the period 1980-2009.

lance and inter-sectoral activities for the prevention and control of the disease. Since 1992 the number of diseased people with brucellosis has shown a constant decline, reaching the lowest number of 274 cases in 2009 (Figure 1). Nevertheless, brucellosis still remains a serious problem in animals and humans in the Republic of Macedonia [11].

Reasons for the abrupt spread and endemisation of brucellosis in the Republic of Macedonia

Lack of adequate anti-epizootic measures have led to the endemisation of brucellosis in the Republic of Macedonia [12, 13].

In the broader sense, the most important reasons for the spread of brucellosis and absence of results in its eradication and control during the entire period of about 30 years were:

- Late detection of brucellosis in animals. This refers to the introduction/importation of brucellosis into the Republic of Macedonia but also to its spread because of late detection of the disease in certain herds or regions;
- Practice of livestock breeding with uncontrolled movement of herds and uncontrolled sale and purchase. Some of the herds from infected and uninfected regions, at the beginning of spring, were moving to summer pastures, and with the onset of winter were returning to lowlands. During the summer there was admixture of the herds in those pastures. On the other hand, the sale and purchase of animals were out of control and overnight sales of non-secure and suspicious herds was going on;
- Until the late 1980s the status of goats was one of the reasons for the spread of the disease in the Republic of Macedonia. Breeding goats was prohibited by law but some households were keeping goats secretly and the veterinary service did not have insight into their health condition;
- the presence of brucellosis in the Republic of Macedonia was kept secret for a long time and that was one of the reasons for negative interference to the prevent and control of brucellosis;
- Inadequate anti-epizootic measures and also failure in the realization of the Programme for the eradication of brucellosis resulted in a prompt spread of the disease among sheep and goats, as well as a rapid increase in the number of diseased people;
- Lack of financial resources and sometimes non-rational expenditure of finances was an additional cause for the spread of the disease;
- Brucellosis in sheep and goats caused by *Brucella mellitensis*, which is difficult to eradicate. Even though there are no successful examples of the eradication of this type of brucellosis, there are countries like France where the disease has already been brought under control [14].

Conclusion

Brucellosis in the Republic of Macedonia during the past 30 years had an intensive epidemiological run.

A few years after its first outbreak in 1980, the Republic of Macedonia has become an endemic territory for brucellosis. Even though since 1992 the number of people diseased with brucellosis has shown a constant decline, brucellosis still remains a serious problem in animals and people in the Republic of Macedonia. The main reason for such an epidemiological development of brucellosis was the lack of a consistent strategy and sufficient resources for continuous implementation of planned measures and activities by health and veterinary services.

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