# EPIDEMIOLOGICAL ASPECTS OF BRUCELLOSIS IN THE RADOVISH AREA IN THE PERIOD FROM 2000 TO 2013

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**ABSTRACT:**

**Aim:** To present the epidemiological situation of human brucellosis in Radovish and surrounding settlements in the period 2003-2013 and to analyze the main factors for the emergence and spread of this disease.

**Material and methods:** Descriptive study based on the epidemiological reports and official data on brucellosis cases from the Institute for Public Health in Skopje and Center for Public Health in Shtip and Radovish.

**Results:** From 2000 until 2013 a total of 712 brucellosis cases were reported in Radovish, at an average annual rate of disease from 180.1 per 100 000 population. In this period, the highest rate of infection with brucellosis was recorded in 2001 (122 patients with incidence rate of 432.0 / 100,000) while the lowest rate was registered in 2013 (only one affected by the incidence rate of 3.5 / 100000).Of the total number of reported cases of brucellosis, 139 or 19.5% are Radovish the town and the surrounding villages are 573 cases or 80.5%. Regarding the structure of diseased after sex, 441 or 62% were male, and 271 or 38% were female. The disease has a seasonal features with the greatest majority of cases in May (16.9%), June (15.3%) and July (15.2%. As for the occupation of patients, it is important that the disease mostly affects people directly involved with keeping and caring for domestic animals.The largest numbers of cases are registered in the age group of 20 -60 and above years.

**Conclusion:** Radovish area is one of most areas of the Republic of Macedonia, where brucellosis is endemic and over several decades is medical, veterinary and economic problem. The spread of infection among animals and people in the Republic of Macedonia persists for more than three decades because in this period there were no organized intersectoral cooperation of all stakeholders in the prevention and eradication of brucellosis. There is a need in the future that intersectoral collaboration to establish.

***Key words:*** *Brucellosis, zoonoses, epidemiology, prevention, Radovish, Republic of Macedonia.*

## Introduction

Brucellosis is an infectious disease of animals and humans caused by bacteria of the genus Brucella, typical zoonosis, primarily a disease of domestic animals: sheep, goats, cattle, horses, pigs, dogs and others. Since the disease affects wild animals in areas where there brucellosis among farm animals. In domestic and wild animals the disease is characterized by a miscarriage of gravid animals (Rust and Worrel,2009, Pappas et al.,2006). Under certain conditions the disease is transmitted from animals to humans. In humans, brucellosis is characterized by a different clinical picture, which causes difficulties in establishing an accurate diagnosis. Characteristic symptoms that occur with acute brucellosis are: fever with undulated character, fever, profuse sweating, loss of appetite and weight loss, joint pain, increase lymphatic glands, increased spleen and liver. The acute form of the disease tends to pass in sub acute or chronic form, with numerous complications, work disability of the patient, and sometimes to permanent disability. Frequent relapses are characteristic of this disease.

Brucellosis is a disease that is widespread throughout the world, especially in those countries where farming is the main industry. In Europe, brucellosis affects mainly the Mediterranean countries, where it is one of the most frequent zoonoses with high incidence rates in spite of the measures undertaken to prevent and control the disease (Pappas et al.,2006, Corbel, 2006, Taleski et al., 2002)

Brucellosis in humans is known as "undulant fever" or "Mediterranean

fever", "Malta fever" or "Bangs disease" (Corbel, 2006). Infection for humans is foodborne transmission via ingestion of contaminated unpasteurized milk or diary products (fresh cheese) and occupational or environmental direct exposure either by contact with skin cuts and abrasions, conjunctival contamination or via inhalation of infectious aerosols (Sokolowski and al.1997,1998, Corbel, 2006, Hutch,2009, Minas et al.2006).

The Republic of Macedonia represents an endemic area where brucellosis prevails as a dominant zoonosis with high morbidity and huge economic losses. Brucellosis in humans is also a big health and social problem in R. Macedonia because of high morbidity, long lasting hospital, chronicity and incapacity for work, relapses and complications (Shumanov et al.,1994,1997,2012 Nikolovski et al. 1998,2002).

**Aim:** The main goal of the paper is to analyze and present epidemiological situation of brucellosis in Radovish and surrounding settlements in the period from 2000 to 2013, using all relevant data regarding this disease registered and available. To determine the distribution and movement of brucellosis in respect of persons susceptible (gender, age, location, profession and seasonal nature); Analyze preventive measures against brucellosis

**Materials and Methods:** For the realization of the objective-applied descriptive epidemiological method, statistical and data analysis. This paper presents epidemiological study of brucellosis in Radovish and surrounding towns for the period 2000 to 2013.

Various data and reports on the illness of brucellosis in humans from the Institute of Public Health, Skopje, and other institutions were used in the study, including official reports on contagious diseases, terrain investigation and epidemiological surveys, monthly and annual reports from the regional centre of public health, "Center for Public Health" - Stip; department of infectious diseases within general hospitals, "Clinical hospital" - Stip.

**Results:** In the period from 2000 to 2013 Radovish and surrounding settlements total reported 712 patients with brucellosis at an average annual rate of disease from 180.1 per 100 000 population (Table 1). In this period, the highest rate of infection with brucellosis was recorded in 2001 (122 patients with incidence rate of 432.0 / 100,000) while the lowest rate was registered in 2013 (only one affected by the incidence rate of 3.5 / 100000).

**Table 1.** Reported brucellosis cases and incidence rate per 100.000 population by years in Radovish, 2000-2013

| Year | Brucel losis cases | incidence rate per 100.000 population |
|---|---|---|
| 2000 | 94 | 332,8 |
| 2001 | 122 | 432,0 |
| 2002 | 93 | 329,3 |
| 2003 | 91 | 322,2 |
| 2004 | 52 | 184,1 |
| 2005 | 41 | 145,2 |
| 2006 | 34 | 120,4 |
| 2007 | 72 | 254,9 |
| 2008 | 60 | 212,4 |
| 2009 | 13 | 40,5 |
| 2010 | 25 | 88,5 |
| 2011 | 9 | 27,9 |
| 2012 | 5 | 17,7 |
| 2013 | 1 | 3,5 |
| **Total** | **712** | **2520,9 (180,1)** |

In the same period in R. Macedonia total reported 3142 cases of brucellosis infected with an average annual rate of infection of 12.9 per 100 000 population (Table 2).

The highest rate was recorded in 2008 (490 patients with incidence rate of 24.5/ 100,000) while the lowest rate was registered in 2013 (36 patients with incidence rate of 1.8 /100000 ).

**Table 2.** Reported brucellosis cases and incidence rate per 100.000 population by years, in R. Macedonia, 2000-2013

| Year | Number of cases | incidence rate per 100.000 population |
|---|---|---|
| 2000 | 422 | 20,9 |
| 2001 | 414 | 20,7 |
| 2002 | 405 | 20,5 |
| 2003 | 378 | 18,9 |
| 2004 | 297 | 14,85 |
| 2005 | 323 | 16,15 |
| 2006 | 309 | 15,45 |
| 2007 | 381 | 19,5 |
| 2008 | 490 | 24,5 |
| 2009 | 287 | 14,35 |
| 2010 | 168 | 8,4 |
| 2011 | 96 | 4,7 |
| 2012 | 82 | 4,0 |
| 2013 | 36 | 1,8 |
| **Total** | **3666** | **181,3 (12,9)** |

During the observed period of 14 years, average annual rate of brucellosis in Radovish and and surrounding settlements was 14 times higher, compared with annual average in R. Macedonia (180.1: 12.9/100 000). The highest rates of incidence (432,0/100,000) were reported in 2001 (Figure 1).

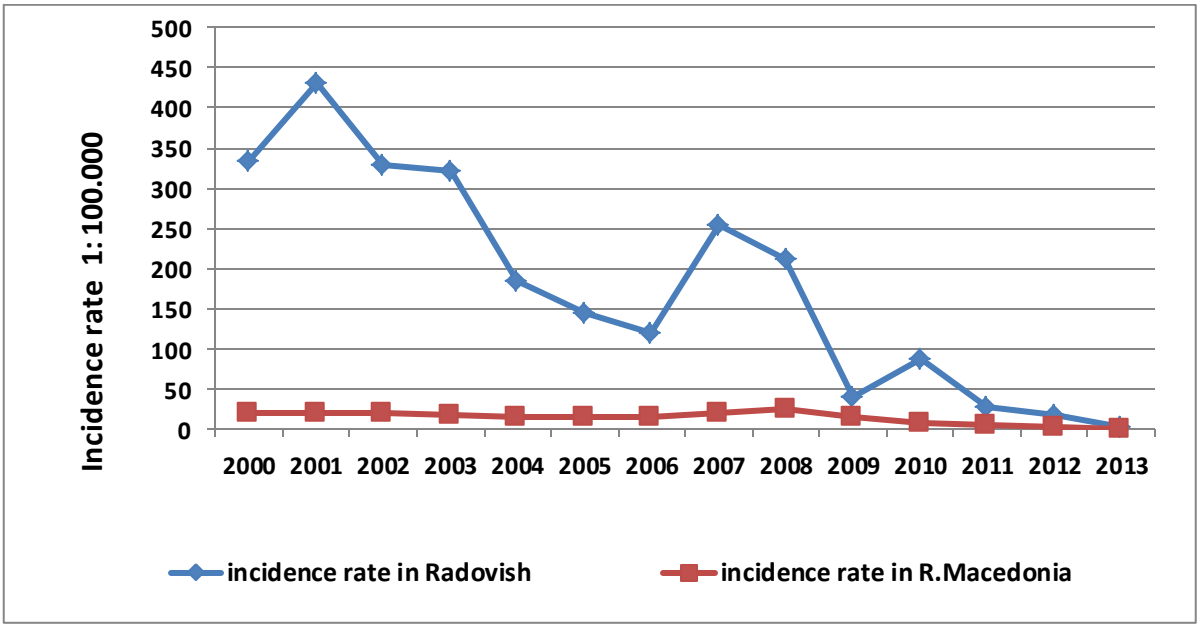


**Figure 1.** Brucellosis in Radovish and in R. Macedonia, 2000-2013 - incidence rate per 100.000 population

The annual incidence rate of brucellosis in Radovish shows a decreasing tendency, from 432,0 in 2001 to 3,5/100,000 in 2013. The annual incidence rate in R.Macedonia shows a decreasing tendency, from 5 in 2000 to 1,8/100,000 in 2013.

The analyzed period, most cases of acute brucellosis registered in Radovish (139) and in the village Injevo (107). In this village, the disease is spreading in epidemic proportions, during 2001 and 2002 (Table. 3).

**Table 3. Representation of brucellosis in Radovish and the surrounding settlements, with highest number diseased, from 2000 - 2013**

| Settlement | Number of cases |
|---|---|
| Радовиш | 139 |
| Тополница | 54 |
| Иньево | 110 |
| Ораовица | 68 |
| Коцалија | 48 |
| Јаргулица | 26 |
| Злеово | 48 |
| Аликоч | 46 |
| **Total** | **400** |

Of the total number of reported cases of brucellosis, 139 or 19.5% are Ravish the town and the surrounding villages are 573 cases or 80.5%.

From the total number of cases, 441 or 62% were male, and 271 or 38% were female. The disease has a seasonal features with the greatest majority of cases in May (16.9%), June (15.3%) and July (15.2%). As for the occupation of patients, it is important that the disease mostly affects

people directly involved with keeping and caring for domestic animals. The largest numbers of cases are registered in the age group of 20 -60 and above years.

**Discussion**

In the period from 2000 to 2013 Radovish and surrounding settlements total reported 712 patients with brucellosis at an average annual rate of disease from 180.1 per 100 000 population. In the same period in R. Macedonia total reported 3142 cases of brucellosis infected with an average annual rate of infection of 12.9 per 100 000 population. Intensity of the disease in Radovish and surrounding settlements was 14 times higher (180.1: 12.9). This difference in intensity in the previous period was even more accented. Compared to other countries, the total number of reported human brucellosis cases in Radovish and R. Macedonia is much higher than in many countries in SEE and the Mediterranean region (Shumanov et al.,1994,1997,2012, Nikolovski et al. 1998,2002).

Brucellosis, is much more common during summer than the winter months, as is the case in Radovish and R. Macedonia. The incidence of human brucellosis in R. Macedonia increased from March to June when it reached the highest peak. Then it started and continued to decrease from June to September and October, reaching the lowest level in the winter period, from November to February. In Germany, the largest number of cases was recorded in August and September (Dahouk et al.,,2007). In Central Greece, two peaks were recorded: one in March and another in May (Minas et al., 2010).

Inadequate implementation of measures against the spread of brucellosis epizootic municipal Radovish and Macedonia, contribute to endemic-epidemic nature of this zoonosis (Shumanov et al.,1994,1997,2012, Nikolovski et al. 1998,2002).

This can be illustrated for example to example of the application of vaccine against brucellosis of sheep and goats in the Republic of Macedonia (20008), when the next time comes to evident reduction in the number of infected animals and then significantly reducing the number of infected people.

The control and eradication strategy was strengthened in 2008 by mass vaccination with Rev 1 live strain vaccine of all sexually mature animals in herds of sheep and goats with a high group prevalence. It was followed by vaccination of young replacements in affected herds, test and slaughter programmes of adult animals identified as infected where the level of disease had been reduced and stabilized at a very low level, with adequate economic compensation to farmers for slaughtered animals (Ministry of Agriculture,2010) .

Cooperation between Veterinary Services and the Public Health Services is necessary in control of zoonotic diseases, including brucellosis, by suitable budgetary allocations for disease prevention and support for the activities of established national joint multidisciplinary committees, aimed at permanent intersectoral consultation and cooperation (Bernard,2010, Donev,2010).

**Concludion**

Radovish area is one of most areas of the Republic of Macedonia, where brucellosis is endemic and over several decades is medical, veterinary and economic problem. The spread of infection among animals and people in the Republic of Macedonia persists for more than three decades because in this period there were no organized intersectoral cooperation of all stakeholders in the prevention and eradication of brucellosis.

For the complete eradication of the disease is necessary an organized and continuous commitment of all government resources. For effective control and eradication of this zoonosis is necessary regional cooperation between South Eastern Europe and Mediterranean countries.

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