

TBE in Slovakia

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E-CDC risk status: endemic (data as of end 2023)

History and current situation

The former Czechoslovak Republic was one of the first countries in Europe where the tick-borne encephalitis (TBE) virus was identified. This discovery was made in 1947, when Rampas and Gallia observed a high incidence of disease identified as “Czechoslovakia encephalitis”, and TBE virus was isolated from *Ixodes ricinus*.¹

In 1951, for the first time ever, and again in Czechoslovakia, the alimentary transmission of TBE virus from infected animals to humans was confirmed during a large outbreak in Rožňava. There were 271 hospitalized and serologically confirmed TBE patients. Blaškovič et al. found that most patients had drunk milk from the local dairy, which did not comply with basic sanitary requirements. The milk had not been pasteurized, but only stirred, equalized, and distributed. In addition, the goat milk that had been supplied to the dairy was also possibly infected.² During the examination of the TBE focus in Rožňava, the goats were found with high anti-TBE virus titers.³

A list of natural foci of TBE in Slovakia was developed by the Public Health Authority of Slovakia in 2002 directly on the basis of virus isolation data from ticks and reservoir animals in the years 1964–1997 from the Institute of Virology, Slovak Academy of Sciences in Bratislava as well as indirectly according to the site of infection in patients with TBE as reported during 1972–2002.⁸ In recent years there has been a shift of natural TBE foci from the southern to the northern and central areas of the country.⁹ The reason is attributed to several factors including climate change.⁴

There is a long-term increasing trend of TBE cases in Slovakia. In 2022 we observed the highest number of TBE cases over the last 60 years³¹.

Slovakia is well known in Europe for TBE alimentary outbreaks that are reported almost every year.¹⁰ Over the last few years, there has been a growing trend in the number of food-borne TBE outbreaks. The percentage of TBE virus infections through consumption of unpasteurized milk and its products is quite high compared with other countries, e. g. in 2023, 34% of alimentary TBE cases were reported³¹. Slovaks like to consume traditional products made from raw goat and sheep milk, especially sheep cheese. Moreover, raw goat milk has been recently promoted as a product to improve health and immunity in humans.

In 2020 we reported a case of probable transmission of TBE virus from an unvaccinated mother to an infant through breast-feeding.⁵

Overview of TBE in Slovakia

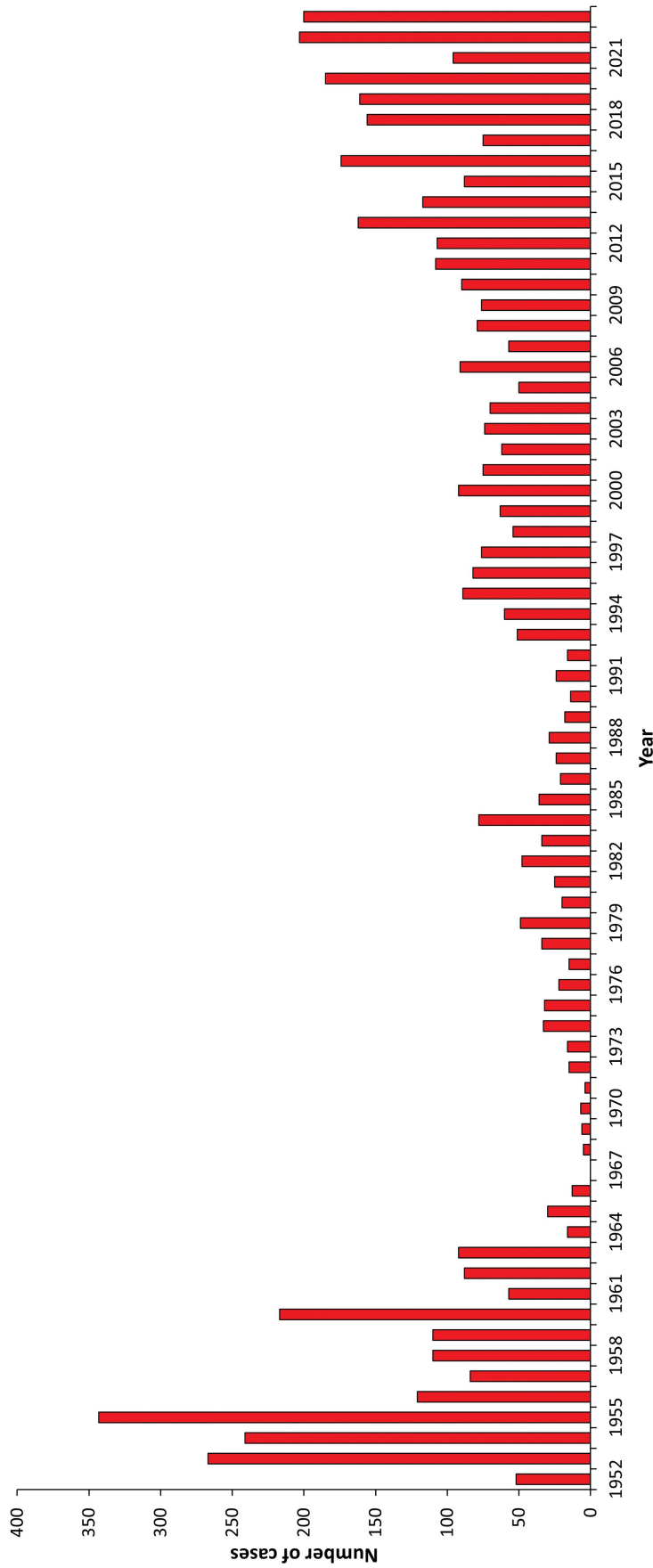
Table 1: TBE in Slovakia

Virus subtypes isolated	European subtype ¹
Reservoir animals	<p>Tribeč region (Jarok pri Nitre, Jelenec, Topoľčianky), 1965: Out of 46 blood and brain samples taken from moles (<i>Talpa europaea</i>), 7 positive isolations of TBE VIRUS were obtained. Therefore, moles can represent not only an important host animal, but may also be considered a reservoir of TBE VIRUS in elementary foci¹¹</p> <p>Tribeč region, 1967: Isolation of virus from the blood of <i>Apodemus flavicollis</i>, <i>Clethrionomys glareolus</i>, and <i>Erinaceus roumanicus</i>¹²</p> <p>Tribeč region, 1967: 2 TBE VIRUS strains were isolated from <i>Ixodes ricinus</i> collected on 2 <i>Turdus merula</i>¹³</p> <p>Lúky pod Makytou, 1981: 5 strains of TBE VIRUS isolated from ticks and organs of <i>Apodemus flavicollis</i> (in 15% infected)¹⁴</p> <p>Western Slovakia (6 localities), 1981–1986: 6 TBE VIRUS strains isolated from organs of <i>C. glareolus</i> (4), <i>Apodemus flavicollis</i> (1), <i>Sorex araneus</i> (1)¹⁵</p> <p>Záhorská Ves, 1990–1992: 8 TBE virus isolates from organs of <i>C. glareolus</i> (6), <i>Apodemus flavicollis</i> (1), <i>Apodemus sylvaticus</i> (1)¹⁶ Košická Belá, 2013: TBE virus from the brain sample of <i>Buteo buteo</i>¹⁷</p> <p>The Drienovská wetland, 2019–2020: 9.8% seropositivity in the birds (n = 37) of 376 tested sera²⁸</p>
Percentage infected ticks	<p>The number of infected ticks in endemic areas varies widely from 0.1% to 5% depending on the season and habitat¹⁸</p> <p>Tribeč, 1964: On average, 0.2% of ticks were infected by TBE virus in the entire Tribeč region. When only elementary foci were taken into account, this proportion increased to 0.4% (Topoľčianky) and 0.8% (Jelenec)¹⁸</p> <p>Záhorská Bystrica, 1965: 1.7% of female ticks infected by TBE virus¹⁹</p> <p>Devín, 1973: 0.1% of nymphs and 1.1% of female ticks infected by TBE virus²⁰</p> <p>Slovakia, 1981: In Slovakia there are 2 types of TBE VIRUS natural foci – Carpathian and Pannonian. In Carpathian natural TBE virus foci, there were 2.6% of ticks infected by TBE virus. In the Pannonian natural TBE virus foci, there were 0.1% of ticks infected by TBE virus²¹</p> <p>Kuríneč, 1982: 0.8% of nymphs and 6% of male ticks (<i>I. ricinus</i>) in south-central Slovakia²²</p> <p>Carpathian and Pannonian types of TBE natural foci, 1972–1982: The proportion of infected ticks in both types of natural foci was 1.7% in total. In Carpathian elementary foci (ranging from 0.4% to 4.1%; average of 2.5% of ticks were infected). In Pannonian elementary foci (ranging from 0.07% to 6.0%; average of 0.9% of ticks were infected)²³</p> <p>Western and Central Slovakia, 1980–1984: Western Slovakia, April–July 1980 (0.7%), May 1984 (0.1%), Central Slovakia April–May 1982 (0.2%)²⁴</p> <p>Western Slovakia, 1985–1990: In Slovakia surveillance of TBE virus in ticks, carried out during 1985–1990 by the Virology Institute of the Slovak Academy of Sciences in Bratislava, showed that the TBE virus distribution rates among ticks ranged from 0.30% (Jarok, Bardoňovo in 1987) to 0.38% (Malacky in 1990) in the 25 sites in the western region (data not published)</p> <p>Žiar nad Hronom, Banská Štiavnica a Žarnovica, 2002–2007: In the small sample of 142 ticks tested, there were 4.98% infected with TBE virus²⁵</p>

Table 1: TBE in Slovakia (continued)

Dairy product transmission	<p>Slovakia is well known in Europe for TBE alimentary outbreaks that are reported almost every year.¹⁰ Over the few last years, there has been a growing trend in the number of food-borne TBE outbreaks. The percentage of TBE virus infection through consumption of unpasteurized milk and its products is quite high compared with other countries, e. g. in 2023, 34% of alimentary TBE cases were reported³¹.</p> <p>During 2007–2016 a total of 26 TBE alimentary outbreaks (2 or more cases/outbreak) with 142 TBE cases have been observed (13.9% of all TBE cases). Larger outbreaks with 3 or more cases have been recorded 13 times. The most common transmission factor of TBE virus during outbreaks has been goat milk and its products (61.5%, 16 outbreaks). Sheep's milk and products have caused probably 7 outbreaks (26.9%) and cow's milk was the probable cause of 2 TBE outbreaks (7.7%). In one TBE outbreak, the probable TBE transmission factor was reported to be mixed goat and sheep milk.¹⁰ In the majority of outbreaks (22) the probable transmission factor of TBE virus was identified epidemiologically.</p> <p>In 2016 a TBE outbreak with the highest number of TBE cases (44) over the past 30 years was reported in Eastern Slovakia, sheep cheese was considered as TBE virus transmission factor by retrospective case control study.²⁶</p> <p>In 2023 a TBE outbreak with 28 cases was reported in Central Slovakia. Sheep cheese was considered as the probable TBE virus transmission factor³¹.</p>
Case definition used by authorities	Based on ECDC, 2018. ²⁷
Completeness of case detection	No valid data to estimate the percentage of undetected and underreported cases.
Type of reporting	Mandatory
Other TBE surveillance	No
Special clinical features	Sequelae 52% (after 3 years) ³⁰
Licensed vaccines	FSME-Immun since 1995; FSME-Immun Junior since 2005
Vaccination recommendations	According to Decree No 585/2008 Coll. of the Ministry of Health of the Slovak Republic, which defines details on prevention and control of communicable diseases, TBE vaccination is compulsory for employees of virological laboratories working with TBE virus and TBE vaccination is recommended for occupationally exposed persons (forest workers, students of forestry schools, agriculture workers, etc.). Insurance companies partially reimburse TBE vaccine in Slovakia. ^{6,7}
Vaccine uptake	20% for 2 or more TBE vaccine doses (general population, survey) ²⁹
National Reference center for TBE	NRC for arboviruses and hemorrhagic fevers Public Health Authority of Slovakia Trnavská cesta 52 826 45 Bratislava, Slovakia

Figure 1: Burden of TBE in Slovakia over time; trend of TBE in Slovakia, 2014-2023 ¹



References

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*According to ECDC classification Slovakia is in 2/3 areas endemic. There were 161 TBE cases in 2019.

There were 4 alimentary outbreaks: 2 cases - goat milk; 2 cases - goat milk (cheese); 3 cases - goat milk; 7 cases - goat milk (cheese)

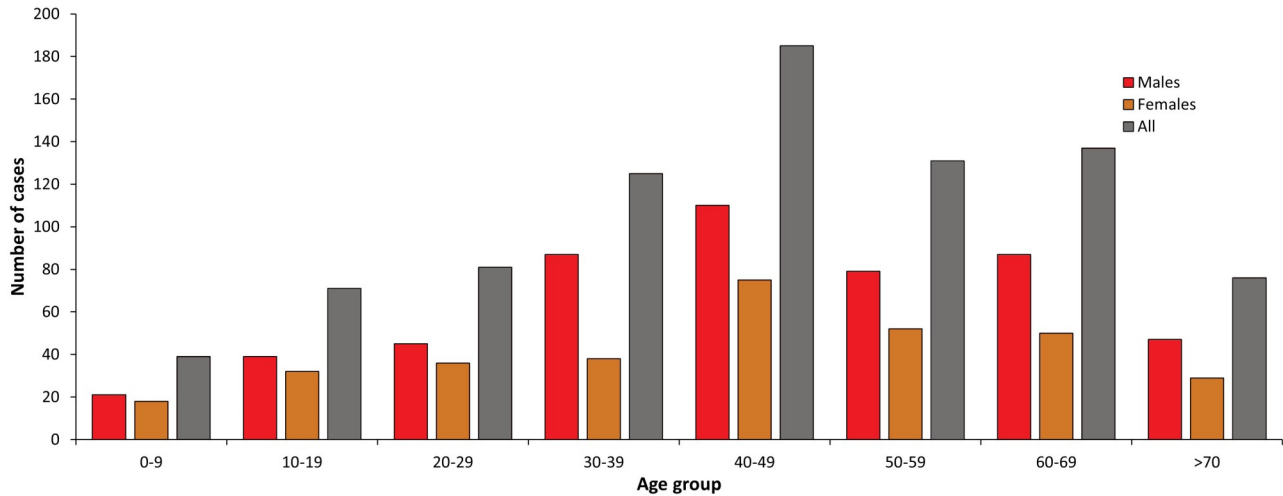
There were 9 sporadic cases, where the transmission mechanism was ingestion of milk/cheese of goat and sheep origin.

**There were 5 family alimentary TBE outbreaks (4 - milk and products of sheep origin, 1 - milk and products of goat origin; 11 cases)

***There was 1 alimentary TBE outbreak (1- milk and products of goat origin; 5 cases)

****Total of 207 TBE cases reported of which 4 were imported.

Figure 2: Age and gender distribution of TBE in Slovakia, 2019-2023

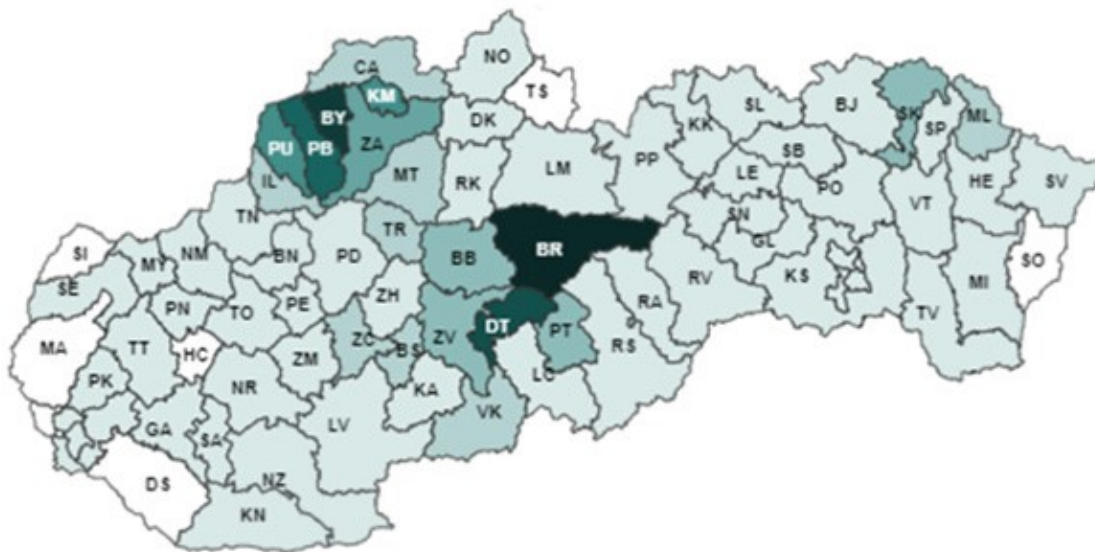


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Source Data: Appendix—Figure 2

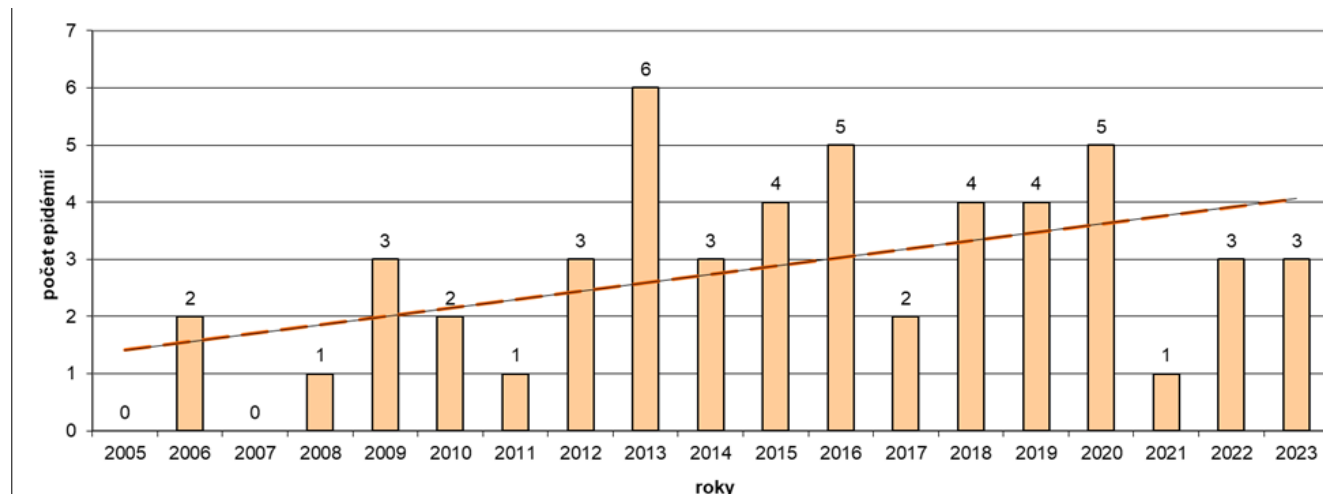
Figure 3: Sites of TBE virus infection in Slovakia, 2019 - 2023



Morbidity

- <0>
- (0.00 - 16.96)
- <16.96 - 33.92)
- <33.92 - 50.88)
- <50.88 - 67.84)
- <67.84 - 84.80)
- <84.80 - 101.76)
- <101.76 - 118.71)
- <118.71 - 135.67)
- <135.67 - 152.63)
- <152.63 - 169.59>

Zdroj údajov: EPIS, © ÚVZ SR

Figure 4: Number and trend of TBE alimentary outbreaks in Slovakia, 2005–2023

Appendix

Source data: Figure 1

Year	Number of cases	Incidence / 10^5
1952	52	1.5
1953	267	7.4
1954	241	6.6
1955	343	9.2
1956	121	3.2
1957	84	2.2
1958	110	2.8
1959	110	2.8
1960	217	5.4
1961	57	1.4
1962	88	2.1
1963	92	2.1
1964	16	0.4
1965	30	0.7
1966	13	0.3
1967	not available	not available
1968	5	0.1
1969	6	0.1
1970	7	0.2
1971	4	0.1
1972	15	0.3
1973	16	0.4
1974	33	0.7
1975	32	0.7

Year	Number of cases	Incidence / 10^5
1976	22	0.5
1977	15	0.3
1978	34	0.7
1979	49	1
1980	20	0.4
1981	25	0.5
1982	48	1
1983	34	0.7
1984	78	1.5
1985	36	0.7
1986	21	0.4
1987	24	0.5
1988	29	0.6
1989	18	0.3
1990	14	0.3
1991	24	0.5
1992	16	0.3
1993	51	1.07
1994	60	1.1
1995	89	1.6
1996	82	1.5
1997	76	1.4
1998	54	1
1999	63	1.17

Year	Number of cases	Incidence / 10^5
2000	92	1.71
2001	75	1.39
2002	62	1.15
2003	74	1.38
2004	70	1.3
2005	50	0.93
2006	91	1.69
2007	57	1.06
2008	79	1.46
2009	76	1.4
2010	90	1.66
2011	108	1.99
2012	107	1.98
2013	162	2.99
2014	117	2.16
2015	88	1.62
2016	174	3.21
2017	75	1.38
2018	156	2.87
2019	161*	2.95
2020	185**	3.39
2021	96***	1.76
2022	203****	3.74
2023	200	3.73

Source data: Figure 2

Age group	Males	Females	All
0-9	21	18	39
10-19	39	32	71
20-29	45	36	81
30-39	87	38	125
40-49	110	75	185
50-59	79	52	131
60-69	87	50	137
>70	47	29	76

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Citation:

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