Part II: Seasonal variations in human infections with Puumula hantavirus in Styria

II. rész: Évszakos változások a Puumula hantavirus okozta humán fertőzésekben Stájerországban

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Abstract: When comparing data for 2012 and 2013 (January to May 2013), significant differences in the number of human infections with Puumula hantavirus can be observed. While in 2012, a new high in the number of human infections was reached, the numbers for the first half of 2013 indicate that human infections are greatly reduced. This correlates with the development of the population of Myodesglareolusduring the same period.

Key words: Myodesglareolus, bank vole, hanta virus, Austria, incidence

Összefoglalás: A Puumalahantavirus okozta humán fertőzések számában jelentős különbségek találhatók a 2012. és 2013. (2013 január-május) évi adatok összehasonlításakor. Míg 2012-ben a humán fertőzések mennyiségében új csúcsok jelentkeztek, 2013 első felében a fertőzések lényegesen csökkentek. Ez egybevág a Myodesglareolus populációban ugyanebben az időszakban végbement változással.

Kulcsszavak: Myodesglareolus, vöröshátú erdeipocok, hanta virus, Ausztria, elterjedtség

EGÉSZSÉGTUDOMÁNY **57/4** 18-23 **(2013)**
HEALTH SCIENCE **57/4** 18-23 **(2013)**
Közlésre érkezett: 2013. szeptember 10.
Submitted: September 10 2013
Elfogadva: 2013. október 2.
Accepted: October 2 2013

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The authors observed that mice populations, for example, Microtusagrestis and Myodesglareolus (see above)are exposed to multi-annual fluctuations. Particularly noteworthy is the mass occurrence in 2012, as reported in various forest protection reports (1). Correlating with this occurrence, a strong increase in human infections with Puumula hantavirus was observed in Styria.

Since various forms of fluctuations in the mice populations can be observed throughout Europe (perennial cycles of 3-5 years, especially in northern countries (1), and annual cycles in other parts (2), it seems likely that a cyclical development of human infections with Puumula hantavirus can be observed in other countries apart from Austria, too.

When looking at the development of the population of Myodesglareolus in Norway for the 1970s, a sharp increase in the population of Myodesglareolus in southern Norway was seen in 1972. A propagation time of 26 weeks was observed, and the mice born in the spring took part in the reproduction in the same year. In 1973, still a large increase in population with a propagation time of now 22 weeks was observed, and only some of the mice born in the spring took part in the reproduction in the same year. In 1974, when the peak of the population of Myodesglareolus was reached, the reproductive period was 13 weeks, and none of the mice born in the spring took part in the reproduction in the same year. The following winter 1974/75 saw a collapse of the population of Myodesglareolus (3).

The authors observeda similar phenomenon in Styria during 2012 and 2013 and also observed a strong increase in the population of Apodemus flavicollis (yellow-neckedfield mouse) during the period of October to December 2012, while there was a gradual decrease in the population of Myodesglareolus.

This is also reflected in the quotas of Myodesglareolus and Apodemus flavicollis caught in various areas in Styria during the first half of 2013. The numbers of Apodemus flavicollis caught in relation to Myodesglareolus stood at a ratio of 7:2 in some areas (1:1 in other areas). In a selected area with high Puumula hantavirus positivity of Myodesglareolus, a relation of 1:3 of Apodemus flavicollis to Myodesglareolus could be observed, however, this is an isolated case.

During the same period, the human Puumula hantavirus infections in Styria also decreased sharply. In 2012, 83 human infections were detected in the period of January to May. The distribution over the months showed that in February an initial increase was observed, which was followed by a slight decline in March. The next increase was observed in April and continues in May. The *Fig. 1* illustrates this:

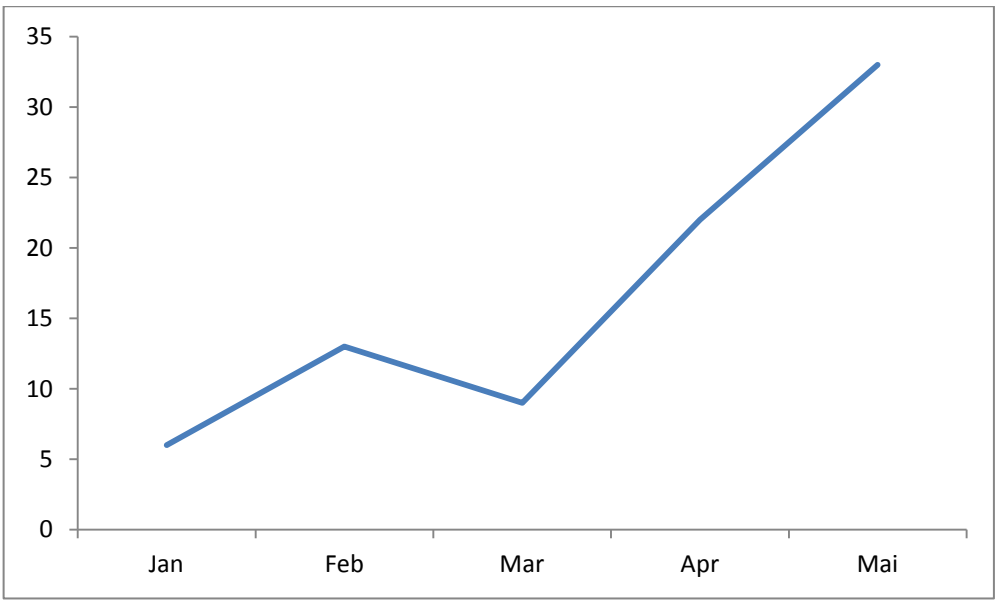

Fig. 1: *Number of human infections with Puumula hantavirus in Styria from January to May 2012*

1. ábra: *Emberi fertőzések Puumula hantavírussal Stájerországban 2012 január-május között*

In the same period of 2013, only 13 infections were reported. In 2013, an increase was observed in February, which was also followed by a slight decline in March. In April, there was only a minimal increase, and in May to a further decline. The following diagram illustrates this *(Fig. 2)*.

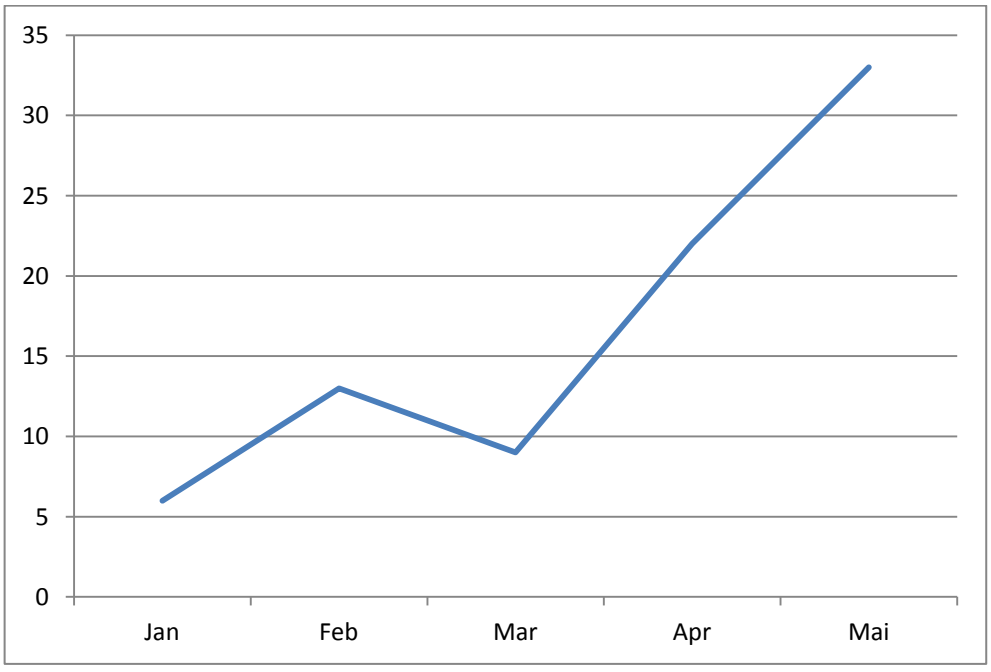

Fig. 2: *Number of human infection with Puumula hantavirus in Styria from January until May 2013.*

2. ábra: *Emberi fertőzések Puumula hantavirussal Stájerországban 2013. január-május között*

Since 1983 infections had been reported in the same period in 2012, this represents a decrease of human infection with Puumula hantavirus by around 85%. A graphical comparison of the two years also shows these differences:In the same period of 2013, only 13 infections were reported. In 2013, an increase was observed in February, which was also followed by a slight decline in March. In April, there was only a minimal increase, and in May to a further decline. The following figure illustrates this *(Fig. 3)*.

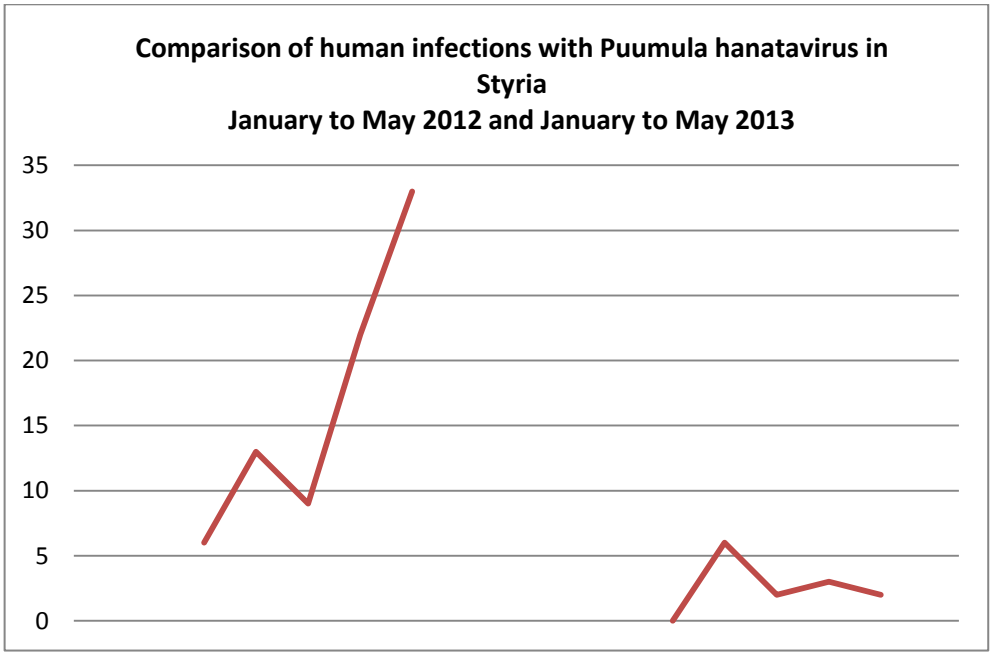

Fig. 3: *Comparison of the number of human infections with hantavirus Puumula in Styria from January until May 2012 and January until May 2013*

3. ábra: *A puumula hantavirus okozta emberi fertőzések Stájerországban 2012. január-május és 2013. január-május között*

A similar trend can be seen in Germany. In 2012, there were 1350 cases of human infections with hantaviruses reported between the 1st and 22 week. During the same period in 2013, only 54 cases have been reported (4).

The authors expect a further decline in human infections with Puumula hantavirus for the remainder of 2013 (compared with the previous year), as the host population was decimated.

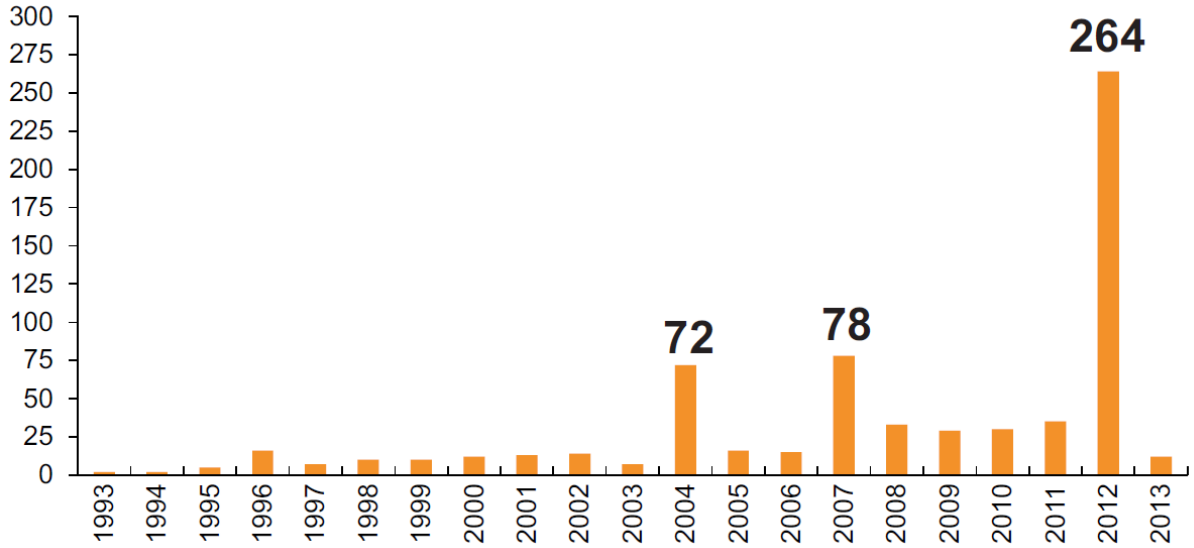

Fig. 4: *Number of Puumala cases/year in Austria*

4. ábra: *Puumala esetek Ausztriában, évenként*

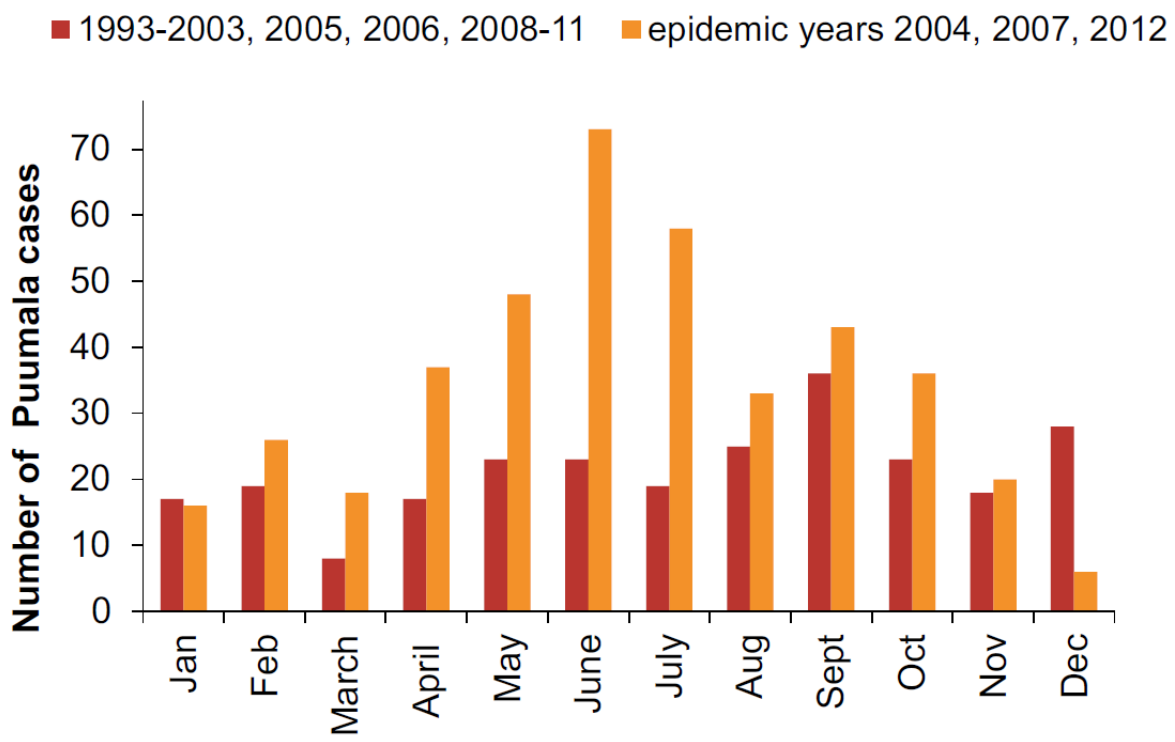

Fig. 5: *Seasonal distribution of Puumala cases in Austria*

5. ábra: *A Puumala esetek évszakos eloszlása Ausztriában*

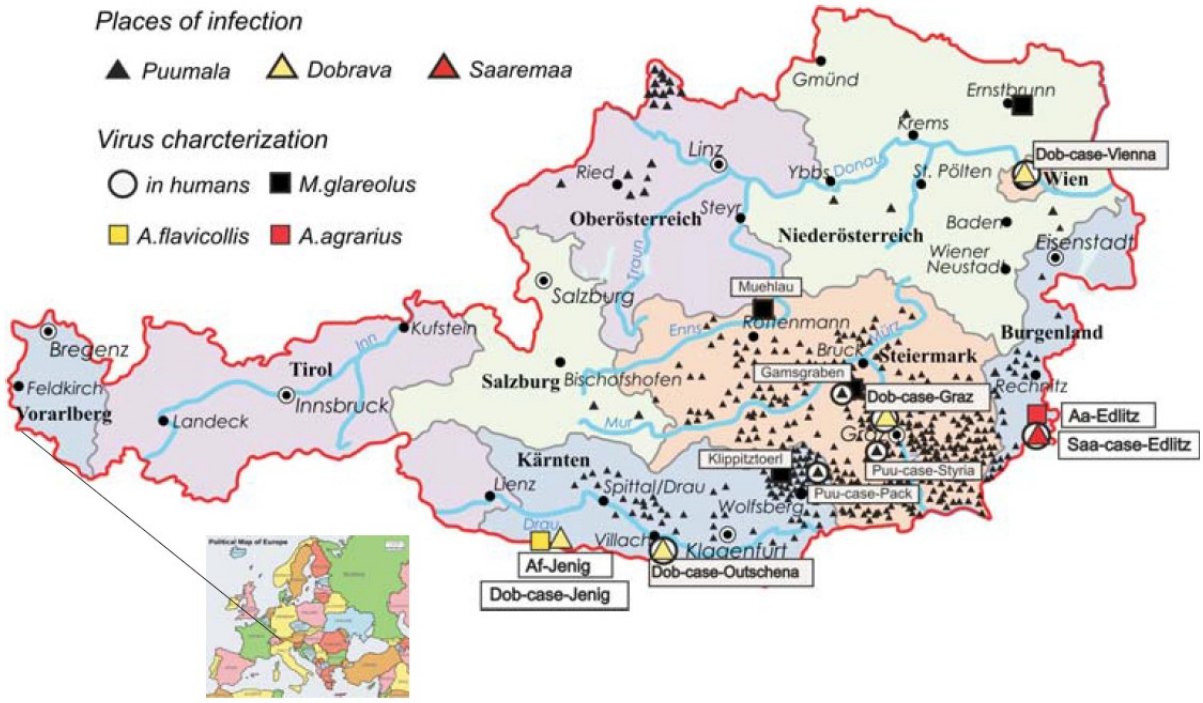

Fig.6: *Endemic regions in Austria*

6.ábra: *Endémiás területek Ausztriában*

Aberle S.W., Sixl W., Redelberger-Fritz M. et al.: Presence of theree human pathogenic hantaviruses Puumala, Dobrabva and Saarema in Austria alapján *(Fig 4-5-6). Poster. IX International Conference on HFRS HPS & Hantaviruses Congress Peking 2013.*

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