

# Human trichinellosis in children from Timis County, Romania: epidemiological features from a retrospective study conducted between 1990 and 2006

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## Summary

Trichinellosis, a parasitic zoonosis caused by the ingestion of inadequately cooked pork containing *Trichinella* larvae, has been a serious health problem in Timis, the largest of the Romanian counties. The authors conducted a survey on trichinellosis in children from Timis County, emphasising epidemiological aspects. Medical records from 106 children who were hospitalised at the Victor Babes Infectious Diseases Hospital in Timisoara from 1990 to 2006 were investigated. Children affected by trichinellosis were predominantly in the 10- to 14-year-old age group (34.9%). Most patients (59.43%) were inhabitants of urban areas and 59.43% of cases were males. Winter was the season when the number of cases peaked (76.42%). The highest prevalence of disease (18.87%) was recorded in 1994. For 38.68% of the patients, eosinophilia ranged between 10% and 20%. The length of hospitalisation ranged from 8 to 14 days in 50.94% of cases. In recent years, human trichinellosis has decreased in Timis County as a result of an improvement in the implementation of hygiene measures. The highest prevalence of the disease recorded in 1994 can be explained by an economic transition period when national pig farms

began to close. Winter was the season with the highest prevalence because people eat a lot of pork during the traditional holidays.

## Keywords

Children, Education, Epidemiology, Health, Hygiene, Pork, Romania, Trichinellosis, Zoonosis.

## Trichinellosi in ragazzi della Contea di Timis, Romania: aspetti epidemiologici in uno studio retrospettivo del periodo compreso tra il 1990 e il 2006

## Riassunto

*La trichinellosi, una zoonosi parassitaria causata dall'ingestione di carne di maiale, infestata da larve di Trichinella insufficiente cotta, ha causato seri problemi di salute a Timis, la più estesa delle contee rumene. Il presente studio si occupa della trichinellosi in ragazzi della Contea di Timis, in particolare degli aspetti epidemiologici. Sono state analizzate le cartelle cliniche di 106 ragazzi ricoverati al Victor Babes Infectious Diseases Hospital a Timisoara tra il 1990 e il 2006. I pazienti affetti da trichinellosi erano perlopiù*

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*compresi nel gruppo di età tra i 10 e i 14 anni (34.9%). La maggior parte dei pazienti (59.43%) proveniva da aree urbane e il 59.43% dei casi di sesso maschile. Nella stagione invernale si raggiungeva il picco dei casi (76.42%). La più alta prevalenza della malattia (18.87%) veniva registrata nell'anno 1994. Nel 38.68% dei pazienti, l'eosinofilia era allineata tra il 10% e il 20%. La durata del ricovero dei pazienti variava tra 8 e 14 giorni nel 50.94% dei casi. Negli ultimi anni, la trichinellosi umana è diminuita nella Contea di Timis grazie alle misure igieniche adottate. La più alta prevalenza della malattia registrata nel 1994 può essere spiegata dal periodo di transizione economica, che ha determinato la chiusura di fattorie di allevamento suino. La stagione invernale ha registrato la più alta prevalenza poiché il consumo di carne suina aumenta durante le tradizionali vacanze.*

#### **Parole chiave**

Carne suina, Educazione, Epidemiologia, Igiene, Ragazzi, Romania, Sanità, Trichinellosi, Zoonosi.

## **Introduction**

The principal source of trichinellosis in Romania is insufficiently cooked pork that is infected especially with *Trichinella spiralis*. Romania is the largest south-eastern European country (approximately 23 million inhabitants) and shares borders with Hungary and Serbia in the west, Bulgaria in the south, the Republic of Moldavia to the east and the Ukraine to the north. Romania has 41 counties, in addition to the capital city Bucharest. Timis County, situated along the border with Serbia and Hungary, the largest of the Romanian counties, has a population of 662 209 inhabitants (1 January 2003). In Romania, between 1963 and 1968, human trichinellosis averaged 79.7 cases per year and from 1969 to 1986, 250-400 cases were reported each year (2). Between 1990 and 1999, the annual incidence of the disease in Romania was 5.5 cases per 100 000 inhabitants (1, 3, 5).

Pork and traditional food prepared from pork (sausages, ham, bacon, blood pudding, mosaic salami, scraps) are eaten in a very high percentage by the population of Timis County,

especially during the winter holidays when a lot of pigs are slaughtered. The objective of this study was to provide epidemiological data on trichinellosis in children from Timis County during the period 1990-2006.

## **Material and methods**

The study group included 106 children, all inhabitants of Timis County who were hospitalised at the Victor Babes Infectious Diseases Hospital in Timisoara from 1990 to 2006. Their hospitalisation records were investigated to provide the necessary information for this retrospective study.

## **Results**

### **Age distribution**

The patients were distributed into the following age groups:

- 0-4 years: 5 cases (4.72%)
- 5-9 years: 31 cases (29.25%)
- 10-14 years: 37 cases (34.9%)
- 15-17 years: 33 cases (31.13%).

### **Gender distribution**

Sixty-three (59.43%) patients were boys and 43 (40.57%) were girls.

### **Area distribution**

Sixty-three (59.43%) patients were from urban areas and 43 (40.57%) resided in rural areas.

### **Annual distribution**

A distribution over 17 years was performed, giving the following results:

- 1990: 7 cases (6.6%)
- 1991: 2 cases (1.89%)
- 1992: 0 cases
- 1993: 16 cases (15.1%)
- 1994: 20 cases (18.87%)
- 1995: 7 cases (6.6%)
- 1996: 6 cases (5.66%)
- 1997: 7 cases (6.66%)
- 1998: 2 cases (1.89%)
- 1999: 14 cases (13.21%)
- 2000: 4 cases (3.77%)
- 2001: 2 cases (1.89%)
- 2002: 2 cases (1.89%)
- 2003: 3 cases (2.83%)

- 2004: 13 cases (12.26%)
- 2005: 0 cases
- 2006: 1 case (0.94%).

### Seasonal distribution

Winter (December, January, February) was the season with the highest prevalence with 81 cases (76.42%), followed by spring (March, April, May) with 11 cases (10.38%), summer (June, July, August) with 10 cases (9.43%) and autumn (September, October, November) with 4 cases (3.77%).

### Distribution according to the clinical forms of the disease

The various types of trichinellosis diagnosed were as follows:

- unspecified form: 58 patients (54.72%)
- benign form: 22 patients (20.75%)
- moderately-severe form: 20 patients (18.87%)
- abortive form: 4 patients (3.78%)
- form complicated by myocarditis: 1 patient (0.94%)
- other complications: 1 patient (0.94%).

### Distribution of cases according to eosinophil value

The ranges of eosinophil values were as follows:

- 10 patients (9.43%): between 0-4.9%
- 17 patients (16.04%): between 5-9.9%
- 41 patients (38.68%): between 10-19.9%
- 17 patients (16.04%): between 20-29.9%
- 10 patients (9.43%): between 30-39.9%
- 3 patients (2.83%): between 40-49.9%
- 2 patients (1.89%): over 50%
- 6 patients (5.66%): the eosinophil values were not specified.

### Distribution of cases according to leucocyte value

The leucocyte values recorded were as follows:

- 89 patients (83.97%): below 10 000/mm<sup>3</sup>
- for 15 patients (14.15%) between 10 000-20 000/mm<sup>3</sup>
- 1 patient (0.94%) over 20 000/mm<sup>3</sup>
- 1 patient (0.94%) the value was not specified.

### Distribution of cases according to period of hospitalisation

In 32 cases (30.19%) the hospitalisation period ranged between 1-7 days, in 54 cases (50.94%) between 8-14 days and in 20 cases (18.87%) between 15-30 days.

### Discussion

Trichinellosis-related surveys focusing especially on children are rare (4, 6). Thus, these results could only be compared with other similar studies in children performed by the authors in neighbouring counties, namely: Arad (1996-2008), Hunedoara town and environs (1996-2005) and Vulcan town and environs (1996-2007) (R. Neghina, unpublished data).

Children from the 5-9, 10-14 and 15-17 years age groups were affected in similar percentages, with a slightly higher incidence in the 10-14 years age group. Patients younger than 4 years old were less affected because they usually do not consume traditional pork products. Comparatively, the distribution of trichinellosis in studies conducted in Arad and Vulcan were similar, but in the study of Hunedoara, children from the 10-14 years age group were most affected (38.52%).

Boys were affected more than girls due to local customs. Usually the boys help their fathers during the slaughtering process (children from rural areas). A similar result was found in the study of Arad (59.21%), but mainly girls were affected in the other two studies. Although most of the affected children were from urban areas, in many cases the source of infection was traced back to the countryside because pork and home-made pork products were sent as gifts to relatives or friends in urban areas. In the other three studies, the children also originated predominately from the urban areas. Most cases were diagnosed in 1994 and 1993, a period characterised in Romania by economic transition (due to the 1989 Revolution) and the poor quality of veterinary pork inspection. Cases were diagnosed mainly during the cold months of the year when the slaughter season was at its peak both in this

study and in the other three. Benign and moderately severe forms were the forms of the disease most often found (when the medical records specified the form of disease), indicating that children are not usually severely affected by the disease, probably due to the low number of larvae ingested.

In some routine and very useful laboratory tests, eosinophils ranged between 10% and 20% for most of the children and the leucocyte values were within normal ranges in most cases, confirming the less severe form of infection. In the study conducted in Arad, either eosinophils or leucocytes ranged within normal values in most cases: in 19.74% of the patients (eosinophils) and in 65.79% of the patients (leucocytes). In Hunedoara, eosinophils ranged between 10% and 20% in 37.04% of the cases and leucocytes were within normal limits in 82.96% of cases. In Vulcan, eosinophils ranged between 10% and 20% in 37.21% of cases and leucocytes were within the normal limits in 90.7% of cases.

For over half of the patients, the hospitalisation period ranged between 8 and 14 days and required considerable health care resources. Similar results were found in the other studies where the hospitalisation period also ranged from 8 to 14 days in 55.26% of cases from Arad, 67.44% of cases from Vulcan and 49.63% of cases from Hunedoara.

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## Conclusions

The years with the highest prevalence of trichinellosis incidence in children in Timis County were 1994 and 1993, the transition period from the large national slaughterhouses to smaller private farms with poor conditions of hygiene. Most patients were from the urban areas but the source of infection was identified in most cases to be the rural areas. Almost all cases were detected during winter with people preparing for the Christmas holidays and New Year celebrations. In over 50% of cases, the hospitalisation period ranged from 8 to 14 days, a fact that incurred high costs. The focus of preventive measures against the disease must be education/awareness of parents in regard to hygiene. Physicians play an important role by providing diagnosis of the disease using routine tests to determine eosinophil and leucocyte values, and pork trichinelloscopy. Immunodiagnosis, using the enzyme-linked immunosorbent assay (ELISA), which is more expensive and requires more sophisticated laboratory equipment, is used less frequently.

## Conflict of interest

The authors have no conflict of interest or financial investments to disclose.