

# TRICHINELLOSIS, STILL A CONCERN? AN 18-YEAR EPIDEMIOLOGICAL SURVEILLANCE OF TIMIS COUNTY, ROMANIA

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## REZUMAT

**Objective:** Scopul acestui studiu retrospectiv este de a prezenta câteva date epidemiologice despre trichineloză umană în județul Timiș, România în perioada 1990-2007 și de a le compara cu rezultatele altor studii efectuate în lume. **Material și metode:** S-au investigat foile de observație ale 530 de pacienți cu domiciliul stabil în județul Timiș, diagnosticați de trichineloză și internați la Spitalul de Boli Infecțioase „Victor Babeș” Timișoara în perioada 1990-2007. Cazurile au fost evaluate pe baza următoarelor criterii: vârsta, sexul, domiciliul, profesia, anotimpul și anul internării. **Rezultate:** Din grupa de vârstă 20-29 ani au fost internați 121 pacienți (22,83%); 280 pacienți (52,83%) au fost bărbați; 88 pacienți (16,6%) au fost internați în anul 1994; 376 pacienți (70,94%) provin din mediul urban; 337 pacienți (63,59%) au avut domiciliul stabil în Timișoara; iarna a fost anotimpul cu cea mai mare rata a îmbolnăvirilor - 429 cazuri (80,94%); 134 pacienți (31,6%) au fost muncitori și alte persoane fără studii superioare. **Concluzii:** Cea mai mare rată a îmbolnăvirii a fost observată în cadrul grupei de vârstă 20-29 ani. Bărbații și femeile au fost afectați de boală în procente aproape egale, cu o ușoară predominanță a bărbaților. Cei mai mulți pacienți au fost internați cu diagnosticul de trichineloză în anii 1994 și 1993. Cu toate că majoritatea pacienților au provenit din mediul urban, deseori sursa de infecție a fost din mediul rural. Cei mai mulți dintre pacienți au făcut parte din populația cu venituri reduse, cu condiții igienice necorespunzătoare. Carnea de porc a reprezentat sursa îmbolnăvirilor.

**Cuvinte cheie:** trichineloză, *Trichinella spiralis*, România, epidemiologie

## ABSTRACT

**Objective:** The aim of this retrospective study is to bring new epidemiological data on human trichinellosis in Timis County, Romania, during the period 1990-2007 and to compare them with other worldwide results. **Material and methods:** Data have been collected by medical record review of 530 patients, inhabitants of Timis County, diagnosed with trichinellosis and hospitalized during 1990-2007 at the Victor Babes Hospital of Infectious Diseases Timisoara. The reported cases have been distributed by age groups, gender, profession, location, season and year of hospitalization. **Results:** The ages of 121 patients (22.83%) ranged between 20-29 years; 280 of the patients (52.83%) were males; 88 patients (16.6%) were hospitalized in 1994; 376 of the patients (70.94%) were from the urban area; 337 patients (63.59%) were from Timisoara; winter was the season with the highest prevalence - 429 cases (80.94%); 134 patients (31.6%) were workers, without superior school levels. **Conclusions:** The highest prevalence of the disease was observed in the 20-29 year old group of patients. Males and females were similarly affected, with a slightly larger percentage of males. The largest number of patients hospitalized for trichinellosis has been reported during 1993-1994. Although most of the patients lived in urban areas, the source of infection has been often identified in rural areas. The disease prevailed in patients with low socio-economic status and poor hygiene standards. In almost all of the cases, the infection occurred as a result of ingestion of raw or improperly cooked pork products.

**Key Words:** trichinellosis, *Trichinella spiralis*, Romania, epidemiology

## INTRODUCTION

Trichinellosis is a parasitic worldwide spread disease caused by ingestion of raw or uncooked pork and other meats containing *Trichinella spiralis* larvae.<sup>1-8</sup>

*Trichinella* was discovered in 1835 by James Paget and the first case of human trichinellosis was reported in 1860, but there are evidences that the disease affected also the ancient Egyptians and it has origins in the prehistoric times.<sup>9-11</sup> In the last years, the knowledge regarding the taxonomy and epidemiology of the *Trichinella* genus has been improved substantially: two main clades are recognized - the encapsulated clade (which includes five species and three additional genotypes) and the nonencapsulated clade (which includes three species).<sup>12</sup>

The human disease is characterized by an initial phase dominated by gastro-intestinal symptoms (diarrhea, vomiting, abdominal pain) followed by a tissular phase with fever, facial and eyelid edema, muscular pain and weakness.<sup>3,4,6,9,11-14</sup>

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The most frequent complications are myocarditis and the neurological ones (especially encephalitis), which can lead to the death of the patient.<sup>3,9,7,11,13,14</sup> Laboratory investigations usually show leucocytosis, eosinophilia and elevation of the muscle enzymes.<sup>9,14</sup> The treatment is made with antihelmintics (Albendazole or Mebendazole), which can be supplemented with corticosteroids.

Romania is the largest south-eastern European country, with approximately 23 million inhabitants. The main source of trichinellosis in Romania is the insufficiently cooked pork, infected especially with *Trichinella spiralis*, although other species were reported (*T. britovi*, *T. pseudospiralis* and *T. nativa*), but in a lower rate.<sup>15</sup> Timis is the most important of the western Romanian counties, situated at the border with Serbia and Hungary. It is the largest of the Romanian counties, with a population of 659,512 inhabitants (2002). The pork and the traditional food prepared from pork are extensively consumed in Timis County during the winter holidays, when a lot of pigs are slaughtered.

The aim of this retrospective study is to bring new epidemiological data on human trichinellosis in Timis County, Romania, during the period 1990-2007 and to compare them with worldwide results.

## **MATERIAL AND METHODS**

The investigation group includes 530 patients diagnosed with trichinellosis, all inhabitants of Timis County, hospitalized at the Victor Babes Hospital of Infectious Diseases Timisoara, during the period 1990-2007. Their medical records have been investigated retrospectively. The cases have been analyzed using the following criteria: age, gender, location, occupation, season and year of hospitalization. Four hundred and twenty-four patients (80%) were adults and 106 patients (20%) were children. Two of the patients died (the fatality rate was fortunately only 0.38%).

## **RESULTS**

### **Age distribution**

The patients were distributed according to the following age groups:

- 0-9 years - 37 cases (6.98%);
- 10-19 years - 98 cases (18.49%);
- 20-29 years - 121 cases (22.83%);
- 30-39 years - 116 cases (21.89%);
- 40-49 years - 86 cases (16.23%);
- 50-59 years - 49 cases (9.24%);
- Over 60 years - 23 cases (4.34%).

### **Gender distribution**

280 (52.83%) of the patients were males and 250 (47.17%) were females. Chi squared test was performed with the following result:  $\chi^2=1.698$  with 1 degree of freedom,  $P = 0.1925$ .

### **Distribution on years**

A distribution on 18 years has been performed: 1990 - 15 cases (2.83%), 1991 - 5 cases (0.94%), 1992 - 5 cases (0.94%), 1993 - 79 cases (14.9%), 1994 - 88 cases (16.6%), 1995 - 34 cases (6.42%), 1996 - 34 cases (6.42%), 1997 - 55 cases (10.38%), 1998 - 62 cases (11.7%), 1999 - 38 cases (7.17%), 2000 - 14 cases (2.64%), 2001 - 39 cases (7.36%), 2002 - 19 cases (3.59%), 2003 - 3 cases (0.57%), 2004 - 31 cases (5.85%), 2005 - 0 cases, 2006 - 4 cases (0.75%), 2007 - 5 cases (0.94%). The mean yearly incidence for the eighteen-year period was 4.46 per 100,000.

### **Distribution according to the location of the patients**

376 (70.94%) of the patients were from the urban area and 154 patients (29.06%) from rural areas.

An exact distribution according to the localities from which they came from was also performed: 337 patients (63.59%) - Timisoara; 28 (5.28%) - Giarmata; 24 (4.53%) - Carpinis; 17 (3.2%) - Buzias; 14 (2.64%) - Pischia; 13 (2.45%) - Pietroasa; 12 (2.26%) - Masloc; 11 (2.08%) - Jamu Mare; 9 (1.7%) - Jebel; 8 (1.51%) - Sacosu Turcesc; 7 (1.32%) - Lugoj; 6 (1.13%) - Birna; each 5 patients (0.95%) - Deta, Faget; each 4 patients (0.75%) - Banloc, Padureni, Recas, Remetea Mare, Sinnicolau Mare; each 2 patients (0.38%) - Bethausen, Breslovat and 1 patient (0.19%) from each of the following localities - Ghiroda, Giroc, Liebling, Mosnita Noua, Sacalaz, Sinandrei, Sinmihaiu Roman, Sag, Tomesti, Topolovatu. (Fig. 1)

### **Distribution by seasons**

Winter (December, January, February) was the season with the highest prevalence - 429 cases (80.94%), followed by spring (March, April, May) - 58 cases (10.94%), summer (June, July, August) - 25 cases (4.72%) and autumn (September, October, November) - 18 cases (3.4%).

### **Distribution of the adults by professions**

Most of the patients affected by the disease were workers, with education lower than college (134 patients - 31.6%), of which only 6 patients (1.42%) were directly involved in meat handling. Other professional categories included: unemployed



of 1031 cases of human trichinellosis in 1990, 1965 cases in 1995, 1175 cases in 2000 and 780 cases in 2004 were reported (Source: CCSS Bucharest - The Centre of Sanitary Calculation, Statistics and Documentation, Bucharest).

Our study was focused on the most important of the western Romanian counties - Timis County.

### **Age distribution**

The prevalence of the disease increases with age, reaching a maximum value in 20-29 and 30-39 year old groups, respectively, and then slowly decreases with age. These facts could be associated with a high protein and hipercaloric diet in the active adult population. The lowest prevalence was observed in people over 60 years old. A limited consumption of meat in elderly patients could be a consequence of a sum of factors like low incomes and comorbidity with the necessity of a restrictive diet. Similar results according to the age groups were found in an American study: 33% of the patients were aged between 31-45 years old.<sup>28</sup>

### **Gender distribution**

By conventional criteria ( $\chi^2 = 1.698$ ,  $P = 0.1925$ ), the difference between male and female patients was not statistically significant. The gender distribution has shown a small predilection for males (52.83%). Similar results were observed in other studies: 61% of the patients were males in a retrospective study from Buenos Aires, Argentina during the years 1994-2003; 59.5% of the seropositive peoples were males in a study about *Trichinella* infection in a hunting population of Papua New Guinea; 53% of the patients were males in a study from the United States during the period 1991-1996.<sup>3,10,28</sup>

This can be explained by the fact that in Romania the men are the most involved in the process of pig slaughtering and the preparation of sausages and other traditional pork products.

### **Distribution by years**

The highest prevalence of the disease in the years 1993-1994 can be explained by a transition period from the large national slaughter-houses to smaller private farms, with poor hygienic conditions, a massive disorganization of the Veterinary Medicine network and a lack of trichinelloscopic inspection of the meat. Nowadays, the number of people affected by trichinellosis has decreased in Timis County, as a result of hygienic rules improvements, according to the Romania's EU integration.

### **Distribution according to the location of the patients**

Most of the patients were from Timisoara, the capital of Timis County, but this fact does not imply that the source of infection was also identified in the city. Numerous people from Timisoara travel to the countryside and buy pigs, either due to economic reasons, or because they prefer the consumption of pork products processed at home, rather than buying from the markets. In these rural areas, most of the people have not used to test the pork for trichinellosis, because they believed that the source is very safe and trustworthy (e.g. slaughtering the pigs raised by their relatives or friends).

### **Distribution by seasons**

Almost all cases of trichinellosis were found during the winter, because people are preparing for the winter holidays, like Christmas and New Year's celebration. Usually, November is the month when they start slaughtering the pigs and preparing the Romanian traditional pork products like sausages, ham, bacon, blood pudding, mosaic salami, scraps, which are eaten during the cold season. On the other hand, autumn is the season with the lowest prevalence, because only towards the end of this season the slaughtering begins, whereas the incubation period for trichinellosis is from 1 to 4 weeks depending on the form of the disease.<sup>14</sup> The same season distribution of the cases has been described by other authors, from different continents: an epidemiological study from China during 2000-2003 and a historical review from Argentina.<sup>4,27</sup>

### **Distribution of the adults by professions**

Workers, low-educated and unemployed individuals were the most affected by the disease, because of their lack of interest in sanitary and medical information. Their low income was also a fact that must be emphasized; an important number of the unemployed people belongs to the gipsy minority, who lives in very poor conditions and eats unsuitable food. The retired were affected in a small percentage because pork is too expensive for the majority of them.

A similar distribution was observed in a study performed in Arad County, which neighbours Timis County, during the great trichinellosis outbreak from January-March 1973: 46.4% of the patients were workers; 19.4% - well-educated and office workers; 3.6% of the patients worked in direct contact with the meat; 8% were retired.

## **CONCLUSIONS**

1. The highest prevalence of the disease was observed in 20-29 years old patients.

2. Males and females were affected in almost equal percentage, with a small predominance of the males.

3. The highest number of patients were hospitalized for trichinellosis during the years 1993 and 1994.

4. Although most of the patients were from urban areas, often the source of infection came from the rural areas.

5. Winter was the season with the highest prevalence of the disease, as a direct result of the traditional national and local customs

6. Most of the patients were from the poor classes of the society, especially people living in promiscuousness and nonhygienic conditions. Retired persons were affected in the lowest percentage because they cannot afford to buy pork.

7. The pork meat was responsible for the disease in almost all cases.

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