Therapeutics, Pharmacology and Clinical Toxicology
Vol XV, Number 2, June 2011
Pages 132-138

ORIGINAL PAPER

ROLE OF EPIDEMIOLOGIC DATA IN MANAGEMENT OF HYDATIDOSIS IN CONSTANTA COUNTY, ROMANIA

Irina Magdalena Dumitru, E. Dumitru, S. Ruginã

Ovidius "University" Constanta

Abstract. Introduction: Constanta county is a Romanian region characterized by a high endemicity (6 cases/100.000 inhabitants) of hydatidosis. This represents a public health problem due to medical and social implications. Specific traditional way of life in Constanta: high number of domestic animals (sheep, cows, goats) are complicated by new epidemiological issues, such as high number of stray dogs, lack of anthelmintics prophylaxis and recommended vaccination in well- cared and stray dogs, specifically presence of dogs on the beach, contaminating the sand. In this article we describe the epidemiological data obtained during a more complex study. The results of the study were presented at the 17th European Congress of Clinical Microbiology and Infectious Diseases (ECCMID) and 25th International Congress of Chemotherapy (ICC) in April 2007. **Objectives.** Evaluation of the interdependence between the links of the epidemic process (source of infection, route of transmission and vulnerable population) and various environmental factors that directly or indirectly contribute to the complex epidemiology of this disease. **Material and method.** We perform a prospective study on 320 patients diagnosed with hydatid cysts between 2001 -2006 from different places in Constanta county. Studied patients were ask to respond to a questionnaire regarding epidemiological aspects of hydatidosis. **Results.** The patients' distribution per sex showed a higher incidence of this disease in women, compared to men; however, there is no significant relationship between hydatidosis and the risk of emergence in women. It is noticed that the highest number of studied cases is the age group 50-59 years old, that was contaminated at the active age, around 40 years old. The case distribution based on the social environment highlighted: a high number of cases from the urban area (234 cases, 72%), especially in Constanta city (182 cases), compared to the rural area (88, 28%). The greatest number of patients belong to the Romanian ethnic group and they represent the majority in our city and county. The second group are the Macedo-Romanians who represent a significant group in Constanta county and are well-known animal breeders, especially sheep. The epidemiologic inquiry was positive in most of the cases, the most of the patients admitted the contact with domestic animals (sheep, cattle, goats and dogs). Out of the 320 patients, 71 had already diagnosed with hydatid cyst in the past. It is noticed that the number of cases diagnosed with hydatidosis in our clinic significantly increased in the last years. **Conclusions.** The numerous sources of infection (dogs) and intermediary hosts (herbivorous) living in Dobrogea area maintain the disease endemicity. Given the minimization of the direct transmission through the improvement of the individual hygiene, the indirect transmission route is preponderant through contamination of the environment and a collective faulty hygiene.
Keywords: hydatidosis, epidemiologic data, stray dogs

Introduction

The hydatid disease, hydatidosis or hydatid cyst is today a helminthozoonosis of international importance due to the long-term evolution, natural and post-surgical complications as well as to the significant public health, economic and social implications it entails.[1]

The cystic form of the disease in humans is caused by *Echinococcus granulosus*, while *Echinococcus multilocularis* is involved in alveolar echinococcosis and *E. vogeli or E. oligarthrus* in polycystic echinococcosis.

Irina Magdalena Dumitru
"Ovidius" University, Clinical Infectious Diseases Hospital, Constanta
e-mail: dumitrui@hotmail.com

The first has the highest prevalence in Romania.[1]

Epidemiology

The are two main types of *Echinococcus granulosus* epidemics: domestic and sylvatic. The intermediate hosts in first situation are dogs and other domestic ungulates and in the second one the wild carnivores and ungulates have this role. [2]

In different regions, different species play the role of definitive or intermediate hosts. In some endemic regions the two describe types of epidemics overlaps. The most frequent type of *E. granulosus* epidemics in humans worldwide is the domestic one, the species involved are dogs, sheep and goats. [3]

For example in Australia, due to specific wildlife, the definitive hosts are dingoes, the intermediate hosts are marsupials which pass the disease to dogs and sheep, the main source of infection for humans. [4]. In Africa and Eurasia there is a more complex situation because of the overlapping domestics and sylvatic life cycles of the parasite. This pose a more problems related to disease control in humans. (fig.1).[3, 4]

People became infected by ingesting the eggs of *E. granulosus* excreted by carnivores, which can contaminate the soil, water and eatable plants or due to contact with feces with eggs or sick animals. [2, 5]

South America (Uruguay, Peru, Chile and Argentina), but also in Mediterranean countries such as Israel, Tunisia, Turkey, Italy, Spain and Croatia. [6]

The highest prevalence was reported in northwestern Kenya, Turkana province (220 cases/100000 inhabitants) and in Israel, in Yirka province, where, in a community of 8200 people was reported one of the most high prevalence in the world, 1583 cases per 100000 inhabitants. [6]

In South America, the highest prevalence was reported in Uruguay (over 100cases/100.000 inhabitants), followed by Chile and Argentina with 80 and 40/100000/inhabitants. [7]

The high prevalence was found in the Mediterranean region: 12/100.000 inhabitants in the region of Zadar, Croatia, 14/100.000 inhabitants in Corsica, 10/100.000 inhabitants in Sardinia and more than 6/100000 inhabitants in parts of Turkey, Italy, Spain and southern France. [8]

Data from Romania shows that Constanța is a county with high endemicity (6 cases/100.000 inhabitants), the same as Brăila (8.2/100.000 inh.), Călărași, Ialomița, Sibiu, Cluj, Timiș and Tulcea (6/100000 inh.) (Fig.2).[10, 11, 12]

There are villages where the incidence of hydatidosis exceeds 10 cases/100.000 inhabitants and it seems that this incidence is underestimated because of lack of epidemic studies in the past few years. [1]

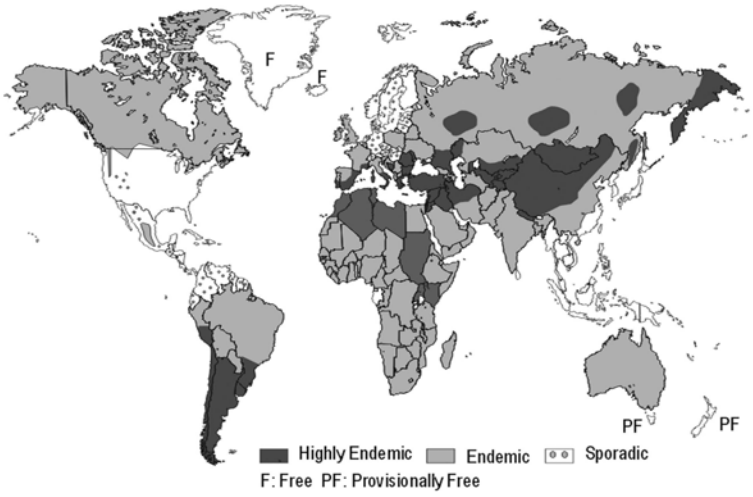

Figure 1. Approximate global distribution of *E. granulosus* (WHO/OIE, 2001)

Global distribution of *E. granulosus* in humans

The adaptability of the parasite *E. granulosus* from different hosts produced a wide geographical spread of the disease. Thus, it is found on all continents and in all climatic zones. The disease is more common in African countries (Kenya, Uganda, Sudan and Ethiopia), Asia (China) and

Specific emergence conditions for Constanta:

- High number of domestic animals (sheep, cows, goats)
- High number of stray dogs
- High number of accompanying dogs
- Presence of dogs on the beach, contaminating the sand

Presence of dogs on the beach (both stray dogs and accompanying dogs) and sand contamination leads to the spreading of the disease especially among children.

Studies performed on sand samples collected from the beach showed the presence of a great number of parasitic species, such as *E. granulosus*. [1]

Defining the lot of patients

The patients' distribution by gender showed a higher incidence of this disease in women, compared to men; however, there is no significant relationship between hydatidosis and the risk of emergence in women (Fig.3)

Figure 2. Number of Human Hidatidosis cases in Romanian counties recorded between 1987 and 1991 (Gherman I, 1994; Stefanoiu V, 1998)

Objectives

Evaluation of the interdependence between the links of the epidemic process (source of infection, route of transmission and vulnerable population) and various environmental factors that directly or indirectly contribute to the complex epidemiology of this disease.

Material and method

- Prospective study
- 320 patients with hydatid cysts in different anatomic locations/organs.
- Period = 5 years (2001-2006)
- Epidemiologic questionnaire: animal contact, species of animals, history of hydatidosis, anthelmintics treatment, ethiniticity, residence address.

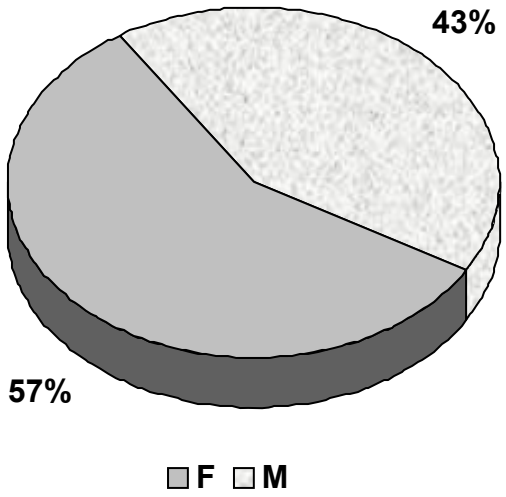

Figure 3. Case distribution by gender

Results and discussions

The epidemiological aspects presented here are obtained during a more complex study involving patients diagnosed with hydatidosis between 2001-2006 in Constanța county. The results of this study were presented in a poster at Parasitology section at the 17th ECCMID and 25th ICC held in Munchen in April 2007. [9]

It is noticed that the highest number of studied cases is the age group 50-59 years old, and the infestation took place at the active age, around 40 years old. (Average = 45.171875, Median = 47), (Fig.4)

In our study, only eight children have been registered (Table I)

The case distribution based on the social en-

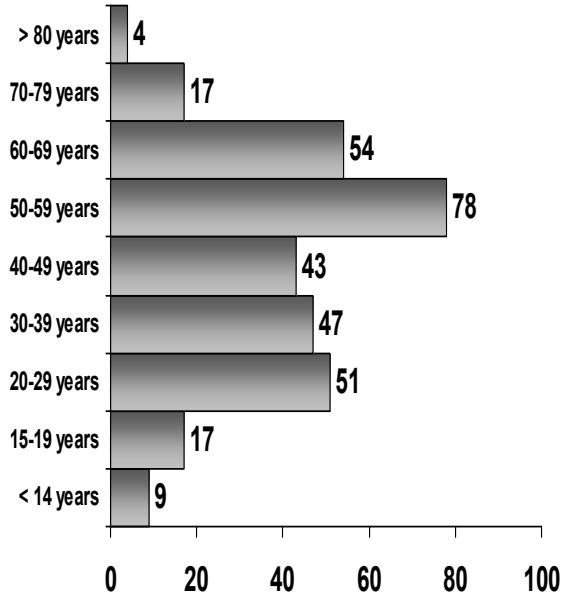

Figure 4. Case distribution by age groups

Age	Number of children
6 years	2
7 years	1
8 years	1
9 years	1
12 years	1
13 years	3
Total	**9**

Table I. Children's distribution based on age

vironment highlighted a high number of cases from the urban area (234 cases, 72%), especially in Constanța city (182 cases), compared to the rural area (88, 28%). (Table II, Table III, Fig. 5).

This might be caused by: the great number of stray dogs in the city, low degree of accessibility for the patients coming from the rural area.

Thus, it is noticed the "urbanization" process of hydatidosis, as Gherman noticed since 1994, pointing to the increasing number of cases coming from the urban area. [2]

It is noticed a great number of cases coming from Constanța city, which can be explained through: increased access to diagnosis facilities, high number of inhabitants compared to the other cities and high number of stray dogs.

Looking at this map, it is noticed that the patients with hydatidosis come from different areas of Constanta county, especially from the villages located in the neighborhood of Constanța city, rich villages, with large households where the peasants

Urban area	Number of patients	Percentage
Constanţa	182	78.44 %
Mangalia	15	6.46 %
Năvodari	11	4.74 %
Medgidia	7	3.01 %
Techirghiol	7	3.01 %
Hârşova	5	2.15 %
Agigea	1	0.43 %
Cernavoda	1	0.43 %
Eforie nord	1	0.43 %
Eforie sud	1	0.43 %
Tulcea	1	0.43 %
Total	**232**	**100.00 %**

Table II. Patients from the urban area

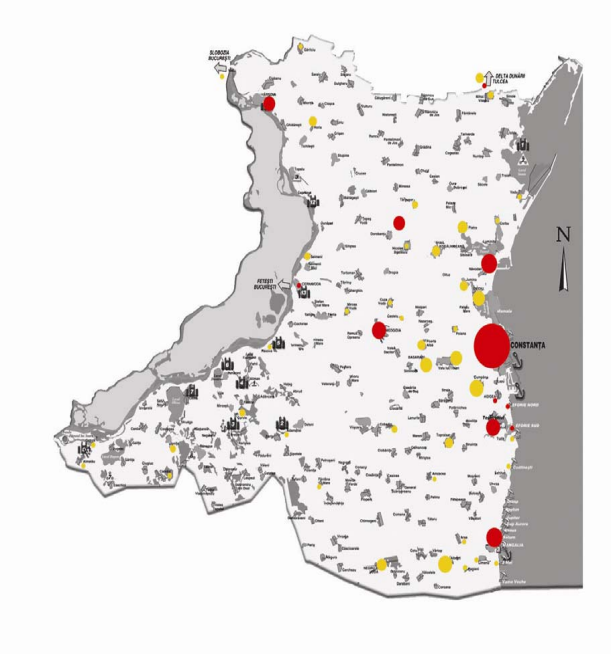

Figure 5. Geographic distribution of cases with hydatidosis in Constanta county [1]

have as main activity animal breeding.

The small number of cases from the north of the county can be caused by the patients' low accessibility to medical care. In this region, there are very poor villages, with small households, often affected by floods, with limited access roads and almost inexistent diagnosis facilities.

The greatest number of patients belong to the Romanian ethnic group and they represent the majority in our city and county (Fig.6). Even if their main activity is not animal breeding, they own dogs with low rate of anthelmintics prophylaxis and treatment, both in the urban or rural area.

Rural area	No of patients	Percentage	Rural area	No of patients	Percentage
Cumpăna	7	7.95 %	Babadag	1	1.13 %
Albeşti	6	6.81 %	Carvan	1	1.13 %
Basarabi	5	5.68 %	Castelu	1	1.13 %
Ovidiu	5	5.68 %	Corbu	1	1.13 %
Valu lui traian	5	5.68 %	Costinesti	1	1.13 %
Negru voda	4	4.54 %	Cuza voda	1	1.13 %
Piatra	4	4.54 %	Dăeni, tulcea	1	1.13 %
Horia	3	3.40 %	Fântâna mare	1	1.13 %
Lumina	3	3.40 %	Gârliciu	1	1.13 %
Mihai kogalniceanu	3	3.40 %	Hagieni	1	1.13 %
Poarta alba	3	3.40 %	Limanu	1	1.13 %
Topraisar	3	3.40 %	Lunca, ialomiţa	1	1.13 %
Cobadin	2	2.27 %	Mircea vodă	1	1.13 %
Ion corvin	2	2.27 %	Nicolae bălcescu	1	1.13 %
Lipnita	2	2.27 %	Ostrov	1	1.13 %
Mihai viteazu	2	2.27 %	Poiana	1	1.13 %
Seimeni	2	2.27 %	Rasova	1	1.13 %
Târguşor	2	2.27 %	Stejaru, tulcea	1	1.13 %
Adamclisi	1	1.13 %	Vadu	1	1.13 %
Almalau	1	1.13 %	2 mai	1	1.13 %
Amzacea	1	1.13 %	23 august	1	1.13 %
			Total	**88**	**100.00 %**

Table III. Patients from the rural area

Education level	Nr of patients	Percentage
Non-enrolled	2	0.62 %
Primary school	69	21.56 %
High-school	164	51.25 %
Post high-school studies	39	12.18 %
Graduates (university studies)	46	14.37 %
Total	**320**	**100.00%**

Table IV. Patients' distribution according to their education level

	Number of cases	Percentage
Family centers of contagion	9	2.89%
Isolated cases	311	97.18%
Total cases	**320**	**100.00%**

Table V. The incidence of the family center of contagion in the studied lot

The second group are the Macedo-Romanians who represent a significant group in Constanta county and are well-known animal breeders, especially sheep. The third group is represented by the patients belonging to the Moslem community (Turks and Tatars), who are famous farmers of sheep in the rural area. The small number of Gypsies under treatment can be explained by the lack of medical culture in this community, negligence and promiscuity. It is very likely that the number of cases in this community is higher, but this cannot be evaluated as they don't seek medical care.

Patients' distribution based on the education level shows a higher incidence in the patients with mid-level education (high-school) (Table IV).

The next group as incidence are the patients with basic studies (primary and secondary school), most of them coming from the rural area, especially from the villages and communes located far from the city. However, the small number of cases with

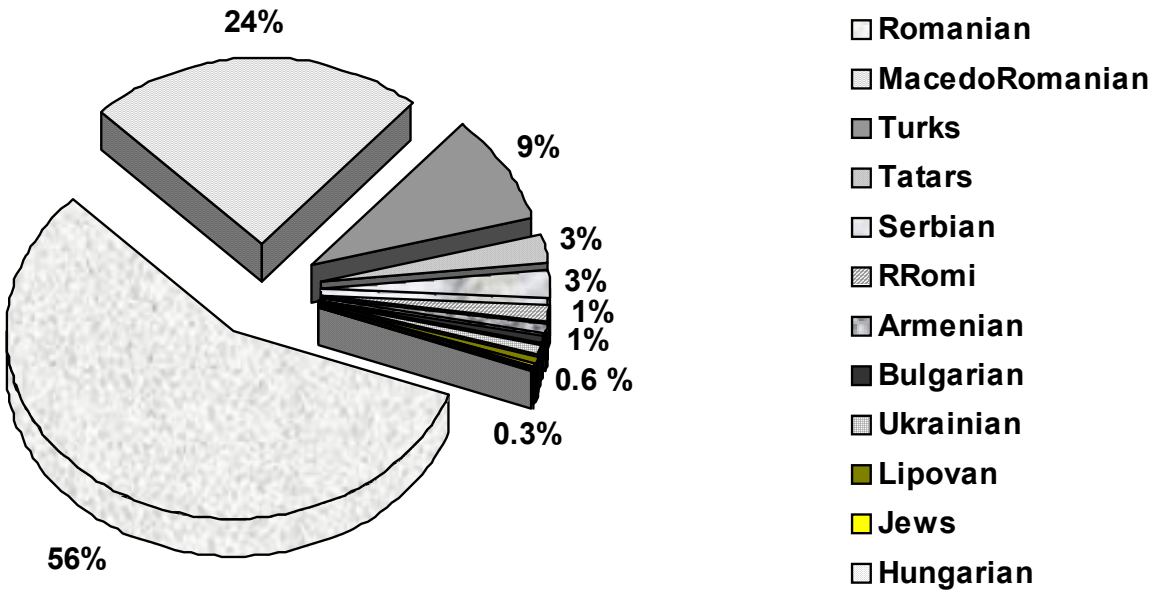

Figure 6. Distribution of cases based on ethnic groups

university studies shows awareness on this problem, knowledge about the disease, transmission routes and implications.

The epidemiologic history was positive in most of the cases (234 cases, 73.12 %), meaning that most of the patients acknowledged the contact with domestic animals (sheep, cattle, goats and dogs) (Table V).

Out of the 320 patients, 71 were diagnosed with hydatidosis before. In most of the cases, the initial therapeutic choice was the surgical one, but the patients did not take the anthelmintics treatment in post-surgical period: either because they didn't have access to drug (surgical interventions before the anthelmintics drugs were available in our country), or because of the surgeons' mistrust in this therapy's capacity to prevent recurrences. [13]

Conclusions

The hydatidosis is a zoonosis whose transmission to human beings is possible through a complex epidemiologic process. The numerous sources of infection (dogs) and intermediary hosts (herbivorous) living in Dobrogea area maintain the disease endemicity in this region. Given the minimization of the direct transmission through the improvement of the individual hygiene, the indirect transmission route is dominant due to contamination of the environment and a public health measures. The disease prevalence in the urban area certifies an increased number of contacts with the animal sources in this type of human settlement, the "occupational" feature of the disease being significantly diminished.

Our data shows the necessity of changing the public health management regarding hydatidosis in Constanta county, especially improving sanitation with better veterinary measures. It is also important to rise le awareness level about echinococcosis in general population and medical personnel

References

1. **Dumitru IM. Thesis –** "Efficacy of Albendazole treatment in hydatid cysts with different location"**. 2006**

2. **Gherman I.** Boala hidatică, Hidatidoza, Echinococoza sau Chistul hidatic. Trichineloza şi Hidatidoza. *Ed. All,* **1999, 79-154.**

3. **Eckert J, Deplazes P.** Biological, Epidemiological, and Clinical Aspects of Echinococcosis, a Zoonosis of Increasing Concern, *Clinical Microbiology Reviews,* **Jan. 2004, p. 107–135 Vol. 17, No. 1, 0893-8512/04 DOI:10.1128/CMR.17.1.107–135.2004.**

4. **Jenkins, DJ. 2002.** Echinococcus in Australia: the role of wildlife in transmission, with particular reference to South Eastern Australia, p. 327–332. In P. Craig and Z. Pawlowski (ed.), Cestode zoononoses: echinococcosis and cysticercosis, an emergent and global problem. *IOS Press,* **Amsterdam, The Netherlands.**

5. **Eckert J, Gottstein B, Heath D, Liu FJ. 2001.** Prevention of echinococcosis in humans and safety precautions, p. 238–247. In *J. Eckert, M. A. Gemmell, F.-X. Meslin, and Z. S. Pawlowski (ed.), WHO/OIE manual on echinococcosis in humans and animals: a public health problem of global concern.* **World Organization for Animal Health, Paris, France.**

6. **Eckert, J, Schantz PM, Gasser RB, et al. 2001.** Geographic distribution and prevalence, p. 100–142. In *J. Eckert, M. A. Gemmell, F.-X. Meslin, and Z. S. Pawlowski (ed.), WHO/OIE manual on echinococcosis in humans and animals: a public health problem of global concern.* **World Organization for Animal Health, Paris, France.**

7. **Larrieu E, Albino B, Primo A.** Cystic echinococcosis: epidemiology and control in South America. *Parasitol Latinoam,* **2004, 59: 82 – 89.**

8. Morovic M. Human hydatidosis in Dalmatia, Croația. *Epidemiolgy and Infection,* **1997, Oct 119 (2): 271-6.**

9. Dumitru I, Rugina S, Dumitru E. Epidemiological considerations about hydatid disease in Constanta county, *Romania ECMID and ICC abstract* **P 549.**

10. Ştefănoiu V. *Teză de Doctorat:* Hidatidoza cu Echinococcus granulosus. Considerații epidemiologice asupra hidatidozei din România, **1998.**

11. Ştefănoiu V, Coroiu Zoe, Iacobiciu I, Olariu R. Date comparate privind Hidatidoza în trei județe endemice: Cluj, Timiș, Constanța. *Rev. Rom. de Parazitologie,* **1999, IX, 2, 7-20.**

12. Ştefănoiu V, Coroiu Zoe, Iacobiciu I, Nemet Codruța, Crucerescu Elena. Aspecte epidemiologice ale principalelor boli parazitare existente în România. *Rev Rom de parazitologie,* **2002, XII, 1:7-9.**

13. Dumitru, I, Dumitru, E, Rugină, S. Considerații asupra tratamentului medicamentos în chistul hidatic**.** *Infecțio.ro,* **2005, 26-27.**