

## Epidemiology of hydatidosis in the province of Sassari, Italy

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**Abstract.** Cystic echinococcosis is endemic in certain parts of the world, including Sardinia, Italy. It was performed a study in the province of Sassari in order to evaluate the incidence of the infection in man and the effects of control programs since 1964 to 2002. Data obtained by surgical records, hospital discharge forms, radiological and pathological files were collected using a case report form. During the years 1964-2002, 2702 new cases were identified (average annual incidence: 17 per 100,000) and 1981 (73.3%) were submitted to surgical treatment. In 57.3% municipalities no cases were observed during the years 1998-2002. Males are more affected (56.2%), mostly farmers-shepherdess (68.6 per 100,000) and pensioners (59.6 per 100,000). Control measures led to a significant decline in the incidence rate of hydatidosis during the period 1964-2002, dropping by 27.6 per 100,000. The mean age of surgical patients increased during the years of surveillance, such as the surgical liver/lung ratio as a consequence of a *cohort effect*. The durability of control programs is the corner stone for obtaining a significant decrease of this infection.

**Key words:** hydatidosis, Sardinia, surveillance, incidence rates.

Hydatidosis is a widespread zoonosis affecting numerous animals, including man that may accidentally becomes intermediate host as a consequence of eating raw vegetables contaminated by the feces of the dogs or intimate contact with infected dogs. Cystic echinococcosis is endemic in certain parts of the world (Sayek *et al.*, 2004). The highest Italian frequency of the disease is found in Sardinia, island of the Mediterranean sea (24,090 km<sup>2</sup>), where many people are involved in sheep raising (Gabriele *et al.*, 2004).

In Italy, the first control program was set up since 1955 in order to decrease the high parasite prevalence in definitive host. Five years later, a regional campaign for Sardinia based on anthelmintic treatment of dogs, war to stray, health education campaign, surveillance municipal slaughterhouses, started in the province of Nuoro, followed by Sassari and Cagliari. In 1978, the second Sardinian control program started, followed after 10 years by a new strategy, pointing out the need of therapy of infected dogs, war to stray (subcutaneous micro-processor), municipal slaughterhouses, health education. In 1993 lack of financial support blocked evident advantages (Arru *et al.*, 1999).

In order to study the epidemiology of hydatidosis in Northern Sardinia and the effects of preventive programs, a surveillance system has been performed since 1964 (Bo *et al.*, 1978; Mura *et al.*, 1981; Maida *et al.*, 1988, 1994, Castiglia *et al.*, 2001).

### Materials and methods

Data on hydatidosis in Northern Sardinia during the period 1998-2002 were collected and reviewed as in

our earlier studies (Bo *et al.*, 1978; Mura *et al.*, 1981; Maida *et al.*, 1988, 1994; Castiglia *et al.*, 2001). Source of data were hospital discharge forms, surgical registers, radiological and pathological records. Case report form for each person was used in order to enter demographic (age, sex, job, residence) and clinical data (year of admission and/or of operation, relapse, signs and symptoms, number and localization of cysts, classification of hydatid cysts, treatment adopted). Information obtained after epidemiological surveillance updated a pre-existing database, containing information since 1964. Descriptive analysis was performed using STATA software.

Average annual incidence rates were calculated on the basis of resident population. The incidence linear trend by year of diagnosis was tested according to linear regression model ( $\alpha=0.01$ ).

### Results

In the present survey (1998-2002), 94 new cases (4.1 per 100,000 inhabitants) and 10 relapses were found (males: 54.8%; surgical treatment: 74%).

During the years 1964-2002, 2702 new cases and 190 relapses were identified in the province of Sassari. Surgical treatment was performed in 1981 new cases (73.3%) and in 92 relapses (48.4%). Cases, including symptomatic and asymptomatic patients, were identified using mainly surgical records and hospital discharge forms, while a lot of asymptomatic persons were identified using radiological or pathological files only.

The mean annual incidence rate changed between 1964 and 2002, from 31.1 per 100,000 to 3.5 per 100,000, with a significant decreasing incidence linear trend ( $b=-0.72$ ,  $p<0.001$ ) as a consequence of the 3 control campaigns started in 1962, 1978 and 1987 (Fig. 1).

Since 1964 it has been evident the effect of con-

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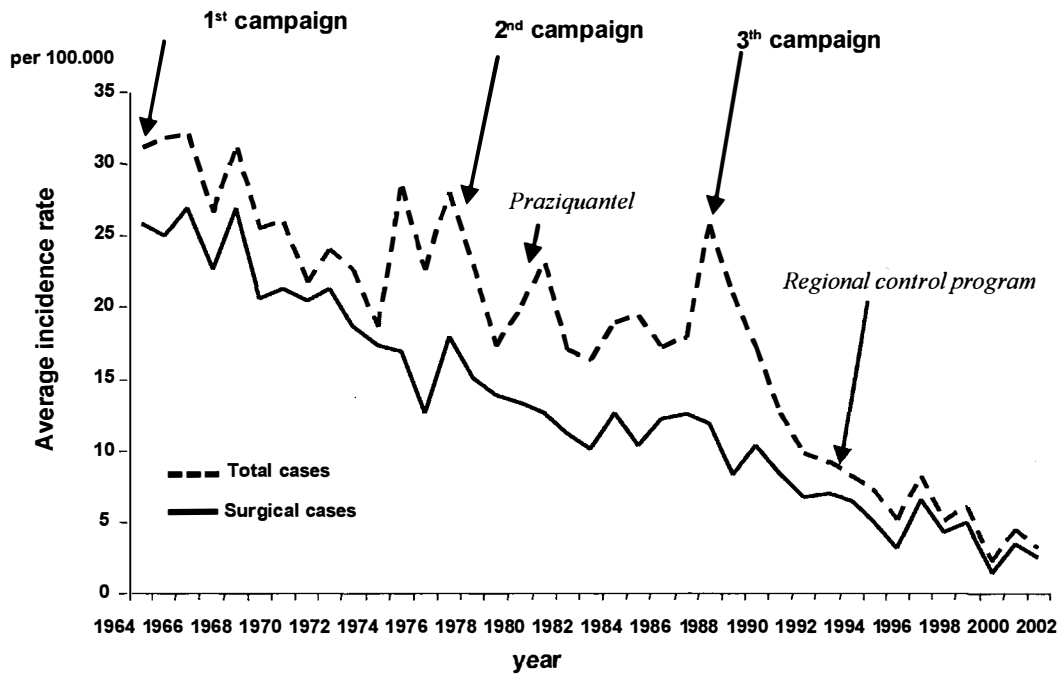


Fig. 1. Trends of hydatidosis incidence per 100,000 inhabitants in province of Sassari during the period 1964-2002.

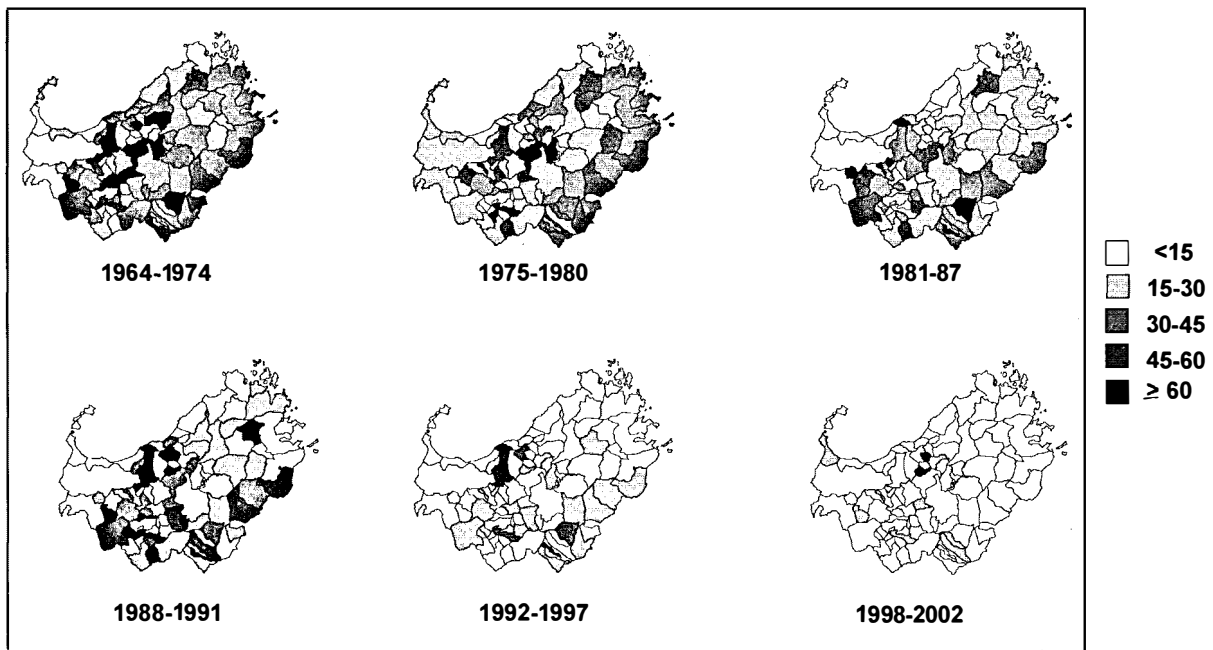


Fig. 2. Incidence rates per 100,000 in Northern Sardinia during six consecutive periods considering municipal areas.

trol measures (Fig. 2): at the present time mean annual incidence rate is below 15 per 100,000 in 30.3% of the municipalities (74.1% of the resident population), above 25 per 100,000 in 3.4% (0.7% of the resident population) and no cases in 57.3% (22.6% of the resident population).

Males are more frequently affected (56.2%), though it was observed a reversed male/female ratio in young-adult age (20-29 years old).

During the surveillance period, it was observed that *E. granulosus* affected mostly people aged above 50 year-old, in particular retired people and housewives. The mean age of surgical patients increased during the years of surveillance, such as the liver/lung surgical ratio increasing from 1.4 to 12.9.

Main professional categories affected by cystic echinococcosis were farmers and shepherds (68.6

per 100,000), followed by pensioners (59.6 per 100,000). It is remarkable a relative persistent number of cases among students in the last epidemiological assessments.

### Discussion

The incidence rate drastically declines during the years. This decreasing trend is significant considering the availability of actual diagnostic examinations (high specificity and sensitivity) associated to the effect of preventive measures elaborated from 1960s. Therefore, we think that the last incidence rates are biased: an increasing number of old patients in the recent investigations may be classified as "prevalent cases", identified through the high sensibility of diagnostic procedures (ultrasonography). This aspect, associated to the introduction of new therapies, such as percutaneous aspiration, explains the increasing surgical liver/lung ratio evidencing an important *cohort effect*; consequently, the parasite burden might be lower than the surveillance system evidenced. Nevertheless, after 4 decades from the first hydatidosis eradication plan is still endemic in Sardinia. Despite imperfect preventive campaigns, results appear comparable to those reported from La Rioja, Spain (Jeménez *et al.*, 2002).

In order to obtain better results, it is necessary to concentrate resources on uncontrolled animals and on an intensive and permanent health information among young people, looking at the relative persistent number of cases among students.

Financial support influence durability of a preventive program and permanent availability of econom-

ic resources represents the basis for a long term success.

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