Updates on Cystic Echinococcosis (CE) in Italy

G. Garippa
Dipartimento di Biologia Animale, Sezione Parassitologia e Malattie Parassitarie, Università di Sassari, Sassari, Italy.

Abstract. An update on Cystic Echinococcosis (CE) diffusion in Italy during 2003-2005 is reported. CE seems to have a sporadic diffusion in the northern part of the country where this disease plays a minor role (prevalence < 1%). Recent investigations have shown the occurrence of CE cases in humans from the mountains between Reggio Emilia and Modena, with an average year incidence between 9.4 and 5.6/100,000. In Abruzzo prevalences in sheep and cattle are 20.2% and 15.3%, with a fertility of 4.6% and 1.3%, respectively. In the same region, G1 and G3 strains were identified and a prevalence of 31% in dogs was found with CaELISA. In Campania, CE prevalence was 14.8% in cattle, with no viable cysts recovered, and 10.5% in water buffaloes, with a fertility of 1.4%. Biotechnologies allowed to find G1 and G3 strains in water buffaloes. In Sicily, CE was found in 67.1% of cattle, with a fertility of 4%, and in 57.6% of sheep, with 9.2% of viable cysts. Biomolecular investigations have found G1 strain in sheep and cattle. In dogs, a prevalence of 5.6% for Echinococcus granulosus was reported. In Sardinia CE prevalence was 75.3% in sheep and 41.5% in cattle, with a fertility of 10.3% and 2.6%, respectively. CE was found also in 9.4% of pigs, with fertility of 6.5%. The G1 strain was recovered in sheep and cattle while the G7 in pigs.

Key words: Cystic Echinococcosis, Echinococcus granulosus, epidemiology, strains, Italy.

Actually in the genus Echinococcus five species are considered: E. granulosus, E. multilocularis, E. oligarthrus, E. vogeli and the recently described E. shiquicus (Thompson and McManus, 2002; Xiao et al., 2005). In the last 15 years biotechnologies have light up inside E. granulosus 10 different strains and genetic variants, named G1 (Sheep strain), G2 (Tasmanian sheep strain), G3 (Buffalo strain), G4 (Horse strain), G5 (Cattle strain), G6 (Camel strain), G7/G9 (Pig strain), G8 (Cervid Strain), the lion strain and the recently discovered G10 or Fennoscandinavian Cervid Strain. These genetic variants differ in host specificity, pathogenicity, transmission dynamics, epidemiology and chemotherapeutic sensitivity. For some of these strains (G4 and G5) these differences are so evident that for various researchers they could be elevated to species status: E. equinus and E. ortleppi (Jenkins et al., 2005). E. granulosus is worldwide widespread and the Mediterranean region is considered a hyperendemic area. In this region, Cystic Echinococcosis (CE) is considered one of the most diffused parasitosis in production animals and also plays an important social role, being the first parasitary zoonosis in the Mediterranean Basin (Eckert et al., 2001). CE is usually a problem where small ruminants are bred with traditional (extensive) methods and in which the lifecycle of the parasite could be completed with sheepdogs, implicating also other animals and man. Molecular techniques have confirmed that sheep-dog-man is the main way of transmission of the parasite, with the G1 homogeneous diffusion. Socio-economic conditions, familiar butcheries and the high number of stray dogs and sheepdogs are some of the most important factors that allow the high diffusion of CE. In this work a complete scenario of CE diffusion in Italy is presented, based on recent investigations. In this country, sporadic, endemic and hyper-endemic areas could be identified. CE seems to have a sporadic diffusion in the northern part of the peninsula: Valle d’Aosta, Piemonte, Liguria, Lombardia, Trentino Alto Adige, Friuli Venezia Giulia and Emilia Romagna regions (Garippa et al., 2004). Recently in Piemonte Rossi (pers. comm.), has found prevalences for CE of 27.9% and 23.5% in sheep coming from the valleys of Turin and Cuneo provinces, respectively. Unexpected prevalences were found with the CA-ELISA in dogs and wolves (24.6% and 26.2%) in Pesio, Turin and Stura areas. In Emilia Romagna, CE in cattle was estimated to be 0.41%-0.54% and a cluster of infection (1.4%) was identified in the north-west area of the province of Reggio Emilia (Guazzetti et al., 2006). It is interesting to underline that the same area was illegally pastured by several sheep flocks and as that practice could constitute a risk factor for CE in cattle. Recent investigations have shown a CE risk area for humans in the mountains between Reggio Emilia and Modena, with an average year incidence between 9.4/100.000 and 5.6/100,000 (Battelli et al., 2004). In Abruzzo (central Italy) from 1981 to 1994 CE prevalences were reported by Garippa et al. (2004): sheep and goats 17.8%-50.8%; cattle 2.3-3.5%; pigs 0.5-0.6; horses 1-3.8%; dogs 4%. Recent data evidenced in sheep and cattle prevalences respectively of 20.2% and 15.3% with a fertility of 4.6% in sheep and of 1.3% in cattle. The molecular characterization revealed genotype G1 (ovine strain) in sheep and G3 (buffalo strain) in cattle. CA-ELISA showed a prevalence of 31% in dogs (Giangaspero et al., 2006). In Arezzo Province CE was recovered in 47% butchered sheep (Bio and Fagiolo, 2004). About CE diffusion in wild animals, Guberti et al. (2004) has described a prevalence of 15% in wolves coming from all the Apennines area, while investigations on fallow deer near Ferrara (Boscone della Mesola) didn’t show any positives to E. granulosus cysts (Battelli, pers comm.). In Apulia, recent investigations in the abattoirs of Foggia, have shown CE in 5.7% of cattle, 5% of sheep.
and 0.02 of equids (Puccini, com pers, 2003), while the situation in dogs (5.73%) was not updated (Puccini et al., 1975). In the period between 1996-2002, the following prevalences for CE were recorded in Basilicata: cattle 2.8%-3.8%, sheep 5%-28%, goats 4%-25%, pigs 0.05%-0.5%, horses 0.04%-0.1% (Quaranta, 2003). In the Campania region, prevalence for CE was 14.8% in cattle with no viable cysts recovered and 10.5% in water buffaloes, with a fertility of 1.4%. Biomolecular investigations allowed to find G1 and G3 strains in water buffaloes (Capuano et al., 2006).

In Sicily, latest investigations found CE in 67.1% of cattle with a fertility of 4%. While in sheep prevalence was of 57.6%, with 9.2% of viable cysts recovered and 10.5% in water buffaloes, with a fertility of 4%. While in pigs prevalence was 70.4%, with 10.5% of viable cysts recovered and 9.2% of cysts (Giannetto et al., 2004). These values were sensibly higher than those reported by Magiardi and Niutta (1995) in cattle (11.13%) and by Poglayen et al. (2003) in sheep (15%), even if this last investigation reported fertility rates from 31% to 90% (Agrigento Province). Biomolecular investigations have found G1 strain in several isolates from sheep and cattle. In dogs, a prevalence of 5.6% for E. granulosus was reported in shepard dogs in 2003-2005, lower than that reported by Giannetto et al. (1997) in Agrigento province (19%).

In Sardinia, CE prevalence was of 75.3% in ovine while the percentage of sheep with fertile cysts was 10.3%. Hydatid cysts were found in 41.5% of the cattle investigated, although, only 2.6% of the animals harboured fertile hydatids. CE was found in 9.4% of pigs examined during home inspection visits and viable cysts were found in 6.5% of sampled animals. Strain typing have shown as all sheep cattle and pigs isolates were identified as the E. granulosus G1 genotype, whereas 2 isolates in pigs were identified as G7 genotype. In cattle, the G1 strain of E. granulosus was found to be frequently infertile (2.6% fertile cysts) (Garippa et al., 2004; Scala et al., 2006; Varcasia et al., 2006). CA-ELISAs performed with the commercial kit (Echinostest, Bommeli CH) found 3% positive while two ELISA which employed monoclonal antibodies (Mabs: EmA9 and EgC3) found 6% and 10% positive respectively on faecal samples of 300 dogs (Varcasia et al., 2004).

The above said scenario for CE diffusion in Italy highlights as the knowledge of the epidemiology of this important zoonosis was increased, even if data from some regions lack. Anyway, according to the described prevalences, in the northern part of the country CE should be considered sporadic, even if recent reports by Rossi, have shown important prevalences in sheep and wolves. The incidence of CE in man in Emilia Romagna (5.6-9.4/100,000 inhabitants/year) results sensibly higher than that reported in 1989-1993 period and only a little bit lower than that reported in Sardinia (Gabriele et al., 2004). The presence of CE in areas where sheep breeding is conducted with traditional methods lead the parasite to affect also other species (Emilia Romagna) and also to maintain constant prevalence during last years in central Italy (Abruzzo). The situation of the two major islands continue to be alarming even if the prevalences and fertility rates seem to be lower than in the past. In Sardinia, the low level of viability of the hydatids found in sheep seems to be related to the increased farm management practiced over the last 10 years. The lack of official data from the National Health System do not allow us to have a complete picture of the parasite diffusion and the possibility of individualize risk situation in non endemic or sporadic areas to promptly put into practice control measures. Anyway, in our country the sheep-dog cycle seems to be the most diffused way followed by the parasite for its diffusion. The epidemiological data (Gabriele et al., 2004) suggest that in Italy the wolf is still part of the classical dog-sheep cycle and thus a true wild cycle has not evolved, although the role of the wolf and its possible implications in the epidemiology of CE in north and central Italy have to be cleared. These data agreed with the biomolecular findings, in fact the G1 strain (and its nearest variants G2 and G3) seems to be the most diffused strain of the parasite, even if the pig strain (G7) was found in a hyper endemic area (Sardinia). Last investigations seem to exclude the presence in our country of G4 (E. equinus) after its recovering in the past years.

Acknowledgements

This paper was carried out with the valuable assistance of G. Battelli, G. Cringoli, S. Giannetto, A. Giangaspero, M.T. Manfredi and A. Varcasia with funds by MIUR PRIN 2003 Prot. 2003070410_001.

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