The epidemiological *scenario* of echinococcosis in the Abruzzo region

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Echinococcosis is still one of the most common parasitic disease in Italy and has important consequences on economic returns, productivity and public health. Although it is a notifiable disease, the lack of notifications in the Abruzzo region is an obstacle to tracing a reliable epidemiological picture of this parasitic disease in humans and livestock. The negative economic and social impact of this zoonosis is still remarkable as demonstrated by the number of human patients hospitalized for cystic echinococcosis in this region (Tieri E, Gatti A, 1995, BEV 14: 1-6; Musa M, Degree thesis, AA 2004-2005). A statistical survey and a molecular study were carried out to update figures and facts (e.g. prevalence in ruminants and dogs and risk factors) and to gather more information (i.e. kind and viability of cysts, strain/genotypes and reliability of coproantigen test) regarding the epidemiological scenario of echinococcosis in intermediate and definitive hosts in Abruzzo region. Three hundred and sixty five sheep and 150 cattle slaughtered at the abattoirs of the three Abruzzo municipalities of Teramo, Pescara and L'Aquila were examined, and their age, sex and geographic origin were recorded. Hydatid cysts were removed from the parasitized organs (liver, spleen, lungs and kidneys), counted and ranked as fertile, acephalocysts, caseous and/or calcified cysts. DNA extracted from 16 samples of the hydatid material obtained (13 from sheep and 4 from cattle) were subjected to different PCRs to amplify sequences within the *Echinococcus* mitochondrial DNA (12S) discriminating the G1/G2/G3 strains of *Echinococcus granulosus* from the G5 and G6/7 strains (Dinkel A *et al*, 2004, Int J Parasitol, 34: 645-653). Direct sequencing was undertaken for NADH and CO1 mitochondrial genes (Bowles J, McManus DP, 1993a, Int J Parasitol 23: 969-972; 1993b, Acta Trop, 53: 291-305). One hundred and thirteen faecal samples (47 from Shepard dogs and 66 stray dogs) were collected and examined by both flotation and CA-Elisa test (CHEKIT-Echinotest, Bommeli Diagnostic). Faecal samples found to be positive for cestode eggs and positive or doubtful at the ELISA-CA test were examined by a PCR-based tool to confirm the sensitivity and specificity of the immunodiagnostic tests. DNA was extracted using a commercial kit and all the samples were subjected to a PCR with the primers EgO/DNA-IM1 to amplify a region within the CO1 gene (Cabrera M *et al*, 2002, Diagn Microbiol Inf Dis, 44: 29-34). The amplicons produced (285bp) were sequenced and compared with those registered in the GenBank™ database. The prevalence recorded was 21% for sheep and 4% for cattle ($P < 0.05$). A statistical correlations was found between the prevalence and the provinces examined ($P < 0.0001$) and age ($P < 0.05$) only in sheep. A statistical difference on prevalence was found between the two examined species ($P < 0.0001$). Cysts were found in the lung and liver of the animals and fertile cysts were detected in 2 out of 150 cows (1.3%) and in 17 out of 365 sheep (4.6%). The molecular characterization of the proligerous membranes and protoscolices from 13 sheep revealed that they belonged to the G1 genotype (ovine strain) and material from two cows showed 100% identity to G1 and that from one cow to G3 (buffalo strain). Six dogs (5 Shepard dogs and 1 stray dog) (5.8%) harboured *Taenia* spp. eggs and 36 (21 Shepard dog and 15 stray dog) tested positive with the Elisa assay. The molecular analysis of CA-Elisa positive and doubtful faecal samples is currently underway. The results regarding prevalence indicate that, after more than ten years (Schiavo A *et al*, 1992, OdV, 1: 45-47; Tieri E, Gatti A, 1995, BEV, 14: 1-6) echinococcosis in Abruzzo region is still a major concern both in cattle and sheep, especially in elder animals. The amount of viable cysts in sheep was greater than that registered even in Sardinia (Scala A *et al*, 2006, Vet Parasitol, 135: 33-38) and their occurrence in cattle highlights the epidemiological role this species has also in this region. The fact that G1 was identified in sheep and cattle in Abruzzo depicts an epidemiological situation which is very similar to that of Sardinia (Varcasia A *et al*, 2006, Parasitol Res, 3: 273-277). Worthy of note was the identification of the buffalo strain (G3) in cattle as this is the first time it was reported in Italy and, more importantly, it is known to be involved in human infections (Busi M *et al*, 2004, Parassitologia, 46: 164). Once the CA-Elisa results have been obtained and compared with those of the molecular analysis of dog faecal specimens and of the molecular characterization of isolates, this first comprehensive epidemiological and molecular study regarding echinococcosis in Abruzzo will be complete. The situation in the region as depicted by the initial findings of the analysis at this point in time is no doubt one of emergency.