

Terminology and practice in control of some parasitic zoonoses

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ABSTRACT. Some terminology, based on tradition and still widely used in practice, is still scientifically incorrect.

Key words: *Taenia solium* taeniosis/cysticercosis, cysticercosis, *Echinococcus multilocularis* echinococcosis, echinococcosis

There are two parasitic zoonoses, where a correct terminology is not respected properly in publications, namely *Taenia solium* taeniosis /cysticercosis and echinococcosis due to *Echinococcus granulosus* and/or *E. multilocularis*. Only sporadically the correct terms are used [1,2]. In common practice and in some official documents the popular names cysticercosis only and echinococcosis only prevail, which might have some negative implications to promote the control strategies of these infections and to database search.

Some people do not care about terminology as far as they believe the title suggests what is about inside a document, a chapter or a paper. Such a simplification is neither scientifically correct nor practically useful. In medical parasitology usually a term of the infection originates from the genus name of a parasite e.g., *Taenia* – taeniosis. In the case there are two or more parasitic species within a genus than a species name is added before e.g., *Taenia solium* taeniosis or *T. saginata* taeniosis [3]. It is rather unusual that a name of infection originates from a parasite larval stage e.g., cysticercus – *Taenia solium* cysticercosis [1]. Of course there are some other exceptions from the general rule e.g., malaria, hydatidosis. The first is traditionally well accepted and widely used, although sometimes plasmodiosis is proposed. The second – hydatidosis – is an old term nowadays less commonly used, being rightly replaced by cystic echinococcosis.

Why a use of precise terminology is important? Firstly, the use of various terms makes database

inconsistent [4]. One may dispute whether taeniosis or taeniasis should be used. The first term taeniosis is more correct, as parasitic infections, especially of zoonotic origin, have an ending – osis (e.g., zoonosis, cysticercosis, toxocarosis, toxoplasmosis) [3]. The later term taeniasis is being traditionally used. Secondly, the incorrect name of an infection, is frequently reflecting an attitude of public health institutions to the control of some zoonoses and might have a negative impact on an effect of its control. In fact by using the term „cysticercosis” alone the insufficient attention is paid to *Taenia solium* taeniosis, the only cause of cysticercosis in humans and pigs. Similarly, *E. multilocularis* echinococcosis – alveolar echinococcosis, might be losing its peculiar clinical and epidemiological importance, being hidden in unspecified echinococcosis chapter, where it is frequently overshadowed by *E. granulosus* echinococcosis – cystic echinococcosis.

Historically, *Taenia solium* tapeworm and its larval stage – cysticercus, named once as a separate species – *Cysticercus cellulosae*, have not been interconnected each other for centuries. The famous „unmoral” experiments of Kuechenmeister in the years 1853 and 1860, performed in a sentenced to death prisoner, gave the evidence that a tapeworm develop from the swallowed cysticerci. Some years later it has been demonstrated that pig cysticercosis develops from the ingested *Taenia* eggs and that the patients with neurocysticercosis frequently are infected by a tapeworm. Thus, one species, *Taenia solium*, responsible for both taeniosis and

cysticercosis, has been finally accepted as late as in the mid-XIX century [1,5]. However, in the minds of people, living in endemic area, infection with a tapeworm remains frequently unrelated neither to cysticercosis in pigs nor with cysticercosis in humans and vice versa. This is certainly a very weak point in managing the taeniosis/cysticercosis control measures in the field. In prevention of epilepsy due to *T. solium* cysticercosis an attempt to diagnose and to treat cases of taeniosis around the epileptic individuals is still neglected [2]. During the academic teaching the inadequate efforts in presenting a mutual natural relationship between a tapeworm and a cysticercus cause, that some medical doctors and public health personnel still do not link cysticercosis with taeniosis in their practice.

In the other words the term „cysticercosis”, being used alone in public health publications, denotes an infection with a larval stage of *Taenia* spp. only and diminish the role of a tapeworm – the sole disseminator of infection. In control of zoonoses usually the major attack is directed towards a reproductive stage, which makes the infection widely distributed. In taeniosis-cysticercosis complex there are some historical reasons depreciating taeniosis. Until 1960., when niclosamide was introduced, the treatment of taeniosis was not very effective and occasionally fatal [6]. On the other hand the control of cysticercosis in pigs, started by rigorous meat inspection in Germany in later 1880. gave – after some decades – the spectacular positive results. However, a time later on it became clear that the disappearance of pig cysticercosis in Europe was due to some other factors as well e.g., increased sanitation, changes in pig husbandry. The later ones are not likely to occur soon in the endemic regions in the developing countries, where the problem exists. Then, historically, the veterinarians very early have started – and still continue – to dominate the scene of control of *T. solium* taeniosis/cysticercosis, leaving identification and treatment of taeniosis in humans underestimated and having a keeping a partnership with the medical sector still weak.

It is time to stick to an ideology of one medicine and a close cooperation between veterinarians and medical doctors in the domain of public health, being praised for decades by professor James Steele [7]. In the official reports, programs, chapters and/or papers a change of the title „cysticercosis” into „*T. solium* taeniosis/cysticercosis” would promote diagnosis, treatment and control of taeniosis in

humans, which are important but still far from being satisfactory [8]. A good example – to be followed – is a change the name of the European Cysticercosis Working Group into European *Taenia solium* taeniosis/cysticercosis Working Group, done at the meeting in Copenhagen in 2010.

Echinococcus multilocularis is one of the four species of genus *Echinococcus*, which deserves nowadays a special attention, especially in central Europe, on Siberia and in Alaska. Historically, the separation of this species from *Echinococcus granulosus* took a century of discussions between parasitologists, representing the uni-cyst theory or a dualistic background. The two species were finally separated each other by Vogel (1955) as late as in mid-XX century [9].

Echinococcus granulosus and *Echinococcus multilocularis* differ in many aspects. As control is concerned the first is spreading mainly in the environment created by humans – the second circulates mainly among wild animals. Clinically they also differ substantially; the alveolar echinococcosis, usually has neoplasma-like course and is being fatal if untreated.

Formally in the WHO disease nomenclature one group is created for *Echinococcus granulosus* – category B 67, points 0–4 and *Echinococcus multilocularis* – same B 67 category, points 5–7. In general practice, in several reports and books, the two species, being so different in several aspects, are put in the same basket – echinococcosis. Especially, when clinical matters and control measures are concerned, a clear separation has to be made between *E. granulosus* echinococcosis and *E. multilocularis* echinococcosis. A common title echinococcosis is not informative enough and may have also an negative impact on the control of alveolar echinococcosis.

In summary, if one want to be correct and objective as well as to promote rightly the control measures, the uses *Taenia solium* taeniosis-cysticercosis instead of cysticercosis alone and *Echinococcus multilocularis* infection or *E. multilocularis* echinococcosis instead of echinococcosis alone are strongly suggested.

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