

Hydatidosis in Morocco: Review of literature and epidemiology

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Hydatidosis or hydatid cyst is a prevalent zoonosis all over the world due to larval forms of the tapeworm of the genus *Echinococcus*. *Echinococcus granulosus* is the most frequent form of echinococcal infection in humans. The disease generally results from an oral ingestion of the parasite ova eliminated with feces of dogs leading to the emergence of hydatid cysts.

Hydatidosis is a health problem that may remain asymptomatic for several years. This disease is endemic in Morocco and is recorded to be a serious problem that requires great caution.

INTRODUCTION

Hydatidosis or hydatid cyst is a widespread zoonosis throughout the world due to larval forms of the tapeworm of the genus *Echinococcus* present in the small intestines of carnivores [1]. Infection with *Echinococcus granulosus* is the most frequent form of echinococcal infection in humans [2]. It is actually endemic in numerous areas of the world, like nations near to the Mediterranean Sea, in addition to northern and eastern Africa, China, South America, central as well as western Asia, and Australia [3]. The disease commonly results from an oral ingestion of the ova parasite eliminated with feces in dogs and transmitted via close contact with infected animals. Moreover, the consumption of contaminated food, which is under scrutiny, is a potential means of infection, especially in developing countries [4]. The disease is endemic in Morocco and presents a serious problem that increasingly draws attention.

Echinococcus granulosus is, known as a tapeworm, belongs to the Taeniidae family. Its adult resides in the small intestine of carnivorous definitive hosts, including dogs, coyotes, or wolves. It is a minute worm of 2 to 9 mm in length. It contains three or four segments and seems to have a globular scolex of 0.3 mm in diameter possessing a rostellum and four cup-like oval suckers. This rostellum structure is armed with a double crown of large and small hooklets. The amount of hooklets can range between 25 and 40 [5]. The scolex is succeeded by a short neck and generally only one or two immature segments; after that there is the mature segment which is the broadest and the longest. The uterus includes up to 500 eggs which are released into the feces from the ruptured segment.

Echinococcal cyst stages take place in herbivorous intermediate hosts, like camels, sheep and cattle. Echinococcal cyst is a fluid-filled, rounded, unilocular cyst which contains an inner germinal layer of cells reinforced by a characteristic acellular, laminated membrane of variable thickness. Every cyst is enclosed by a host-produced layer of granulomatous adventitial reaction. Small vesicles named brood capsules bud internally from the germinal layer and generate multiple protoscolices via asexual division [6]. Humans get infected by eating tapeworm eggs transferred from an infected carnivore.

CLINICAL FEATURE

Accidental human infestation by larval form leads to the emergence of hydatid cysts. Generally, primary infections in humans are represented by a single cyst; nevertheless, 20-40% of persons have multiple cysts or multiple organ involvement [7]. The liver and lungs are the most commonly affected organs [8]. Less frequently involved organs are the spleen, the kidney, the heart, the bone, central nervous system, and other organs [9]. Hydatidosis is a health problem that may remain asymptomatic for several years, with symptoms generally appearing only when the cysts increase in size [10].

DIAGNOSIS

The ultimate diagnosis for most human forms of hydatid disease is through physical imaging techniques, like ultrasonography, radiology, computed tomography and also magnetic resonance imaging [11]. Antibody assays are helpful to check presumptive radiologic diagnoses; however, few affected individuals with cystic echinococcosis do not reveal a detectable immune response [12]. In current times, significant efforts are already made to improve most of these techniques employing new recombinant proteins, synthetic peptides, and combinations of identified antigens. Nonetheless, regardless of the fact that immunoglobulin levels are undetectable, solely 60%-80% of affected people are seropositive [13]. The indirect hemagglutination test is sensitive but is currently being changed by the enzyme immunoassay (ELISA) for preliminary checking of sera. Confirmation of reactivity can be acquired by illustration of specific echinococcal antigens by immunoblot assays. Eosinophilia is found in <25% of infected people. In seronegative persons, a presumptive diagnosis could be proved by showing protoscolices or hydatid membranes in the liquid extracted by percutaneous aspiration of the cyst [14].

EPIDEMIOLOGY

Around the world, the important endemic regions are localized in the Mediterranean peripheries: North Africa, Middle East, Greece, Turkey, Cyprus, and southern Italy and

Spain (The human infestation incidence is about 10 cases per 100,000 inhabitants), as well as East Africa, especially Kenya, where the incidence is the highest in the world with 220 cases per 100,000 inhabitants [15].

Current reports reveal the endemic occurrence of *E. granulosus* in dogs as well as in livestock and of human cases of CE in almost all North African Arabic countries which include Algeria, Libya, Egypt, and Tunisia [16]. In Algeria, annual incidence according to hospital cases has been recorded 3.6–4.6/100,000 populations [17]. The incidence of surgically proved cystic echinococcosis in eastern Libya was expected to be less than 4.2 cases per 100,000 inhabitants. [17].

This incidence is less than Tunisia which is estimated of 15 cases per 100,000 inhabitants [18]. Christine M. Budke et al reported in systematic reviews an incidence rate of 2.3, 3.1, 3.35, and 18.0, 32.0/100,000 persons-year in Jordan, Palestine, Bulgaria, Kyrgyzstan and Peru respectively [19].

EPIDEMIOLOGY ON MOROCCO

The exact data on the prevalence of this disease is unknown. It is certainly underestimated due to the existence of asymptomatic forms and the low level of medicalization of the population. Thus, studies on the prevalence of hydatid disease in humans are rare and are mostly devoted to rural and operated cases [20].

The distribution of operated hydatid cyst cases in different regions of Morocco shows that the highest incidence is found in two regions: Rabat-Salé-Zemmours-Zaers and Meknès-Tafilalet fig 1 [21].



Fig (1): distribution of operated hydatid cyst cases between 1980 and 1992 in public hospitals

Another study was carried out by Derfoufi et al to evaluate the epidemiological profile of hydatidosis in Morocco between 1980 and 2008 declared an increased number of annual cases estimated to 5,2 per 100 000 habitants [22].

In Morocco, the transmission of the parasite through a synanthropic cycle including dogs and livestock (sheep, cattle, camels, and Equidae). As outlined by Gemmell et al. [23], 8,470 eggs are eliminated by infected dogs daily. Therefore, there is an increased pollution of the environment with eggs. A large number of dogs (estimated of around 2 millions) and which keep the livestock in the farms live in close contact with the rural population.

The number of stray dogs in the villages and on the outskirts of cities is also a major factor in the transmission; the high percentage of the population who hardly have any knowledge about the disease and the factors of its transmission is another cause of the disease spread [24].

Sheep and cattle are the major intermediate hosts in Morocco, but sheep are considered the main source of infection to dogs and subsequently to human [25].

There are a lot of celebrations or occasions, like weddings and Aid El Kebir (the great feast) in the Muslim countries, in which the ritual home-slaughter of millions of sheep takes place (5 million sheep and goats in Morocco). This habit leads to multiplying the parasite in owned and farm dogs, which helps to preserve high infection rates in these dogs, in ruminants and in humans [26].

CONCLUSION

The risk of hydatid infection is high in rural regions where the close contact between dogs and humans is frequent. To control the disease, the measures should focus on dogs as the main factor of transmission. So it is necessary to get rid of stray dogs, deworm the suspected infected dogs as pets at home, and incinerate infected organs from dead intermediate animal hosts in addition to individual hygiene based on washing hands after gardening or touching dogs.

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