

Hydatid Cyst in Iran at a Glance

Ershiya Bagheri Torbehbar^{1*}, Elham Houshmand²

¹Department of Pathobiology, Faculty of Veterinary Medicine, Rasht Branch, Islamic Azad University, Rasht, Iran

²Department of Biology, Faculty of Basic Science, Rasht Branch, Islamic Azad University, Rasht, Iran

ABSTRACT

Hydatidosis is a major public health problem globally and in Iran and caused by *Echinococcus* spp. This zoonotic disease is responsible for approximately 1% of human admission cases to surgical wards in Iran and the rate of human infection is high. Hydatid cyst infections can also negatively affect livestock productivity. The prevalence of hydatid cysts in human and animal reservoirs has been observed in many provinces of Iran, which convinced the authorities to implement appropriate programs to decrease the outbreak of the disease.

Keywords: Hydatid Cyst; *Echinococcus*; Prevalence; Zoonotic; Iran

Introduction

Hydatidosis is a chronic parasitic disease and is one of the most important diseases transmitted between humans and livestock [1]. This zoonotic disease in humans and herbivorous animals such as sheep and cattle is caused by the larval stage of *Echinococcus* spp.[2]. There are two ways that humans can be at risk of infection. Firstly, they can be infected accidentally by ingesting soil, water, food or vegetables contaminated with the eggs of *Echinococcus*. Secondly, direct contact with infected dogs (patting or handling) may lead to infection as well [3]. The presence of larva (cyst) in different organs particularly liver, lung, and occasionally brain, heart and spinal cord can cause hydatidosis and the rupture of the cyst can lead this worm to other tissues through blood, which causes metastatic characteristics similar to cancer. Due to significant economic damages of hydatidosis in the public health and livestock industry, it is a major health and economic problem where all developed countries consider this disease as a global dilemma [4] [5].

Iran with having 70 million sheep and goats is a major breeder of these animals in the world and it proves the fact that why hydatidosis is one the most important endemic zoonosis diseases in this country. Khorasan province, in the northeast of Iran, has the most cases of hydatid cyst infection among the Iranian provinces [4]. However, it has been proven that provinces with

moderate and humid climate have the highest rate of hydatidosis, contrary to other provinces [6].

Methods

The published cases of Hydatid cyst infections in Iran were reviewed via a search in PubMed, Scopus, Scientific Information Database (SID), Google Scholar, Iran Medexand Springer. All the obtained sources were examined and the necessary information about the Hydatid cyst and its prevalence in Iran was extracted.

Findings

Echinococcus is an important and potentially fatal zoonotic infection that infects humans and livestock in many parts of the world including Iran and is caused by tapeworms of the *Echinococcus* genera. Several species

of *Echinococcus* have been identified that can harm humans: *Echinococcus granulosus*, *E.multilocularis*, *E. vogeli* and *E. oligarthrus*. *Echinococcus* is also known as the hydatid worm, hyper tape-worm or dog tapeworm, which is a cyclophyllid cestode that dwells in the small intestine of carnivores like dogs as an adult and has intermediate hosts such as livestock and humans [8][9]. Home-slaughtered sheep and goats in the countryside are completely unsanitary and this has led to a large number of organs contaminated with hydatid cysts, causing dogs

Correspondence to: Ershiya Bagheri Torbehbar, Department of Pathobiology, Faculty of Veterinary Medicine, Rasht Branch, Islamic Azad University, Rasht, Iran, Tel: 989119407375; E-mail: ershiyabt@gmail.com

Received: September 05, 2020; **Accepted:** August 30, 2021; **Published:** September 09, 2021

Citation: Torbehbar EB (2021) Fascioliasis in Iran. Clin Microbiol 10: p218

Copyright: © Torbehbar EB. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

to become infected by this parasite. Insects specifically houseflies can transfer the eggs of this parasite and contaminate foods [1] [7]. According to the World Health Organization (WHO), almost one million people are affected by Echinococcosis globally, and it results in high costs of treating patients and damage to the livestock industry as well [10]. Ingesting the parasite's embryonated eggs through contaminated uncooked foods, drinks or vegetables, and direct contact with infected livestock particularly carnivores (primary hosts) infects humans. The larvae reach the blood of humans and is transported to the liver via the portal tract, lungs, kidney and other organs where they transform into small cysts. Symptoms of Echinococcosis are slow to manifest because of cyst formation, except when the disease occurs in the brain and the eyes. General symptoms include pain, coughing, low-grade fever, and the sensation of abdominal fullness. These symptoms become more specific when the disease grows massively and infects the human body. Although cysts in the central nervous system, musculoskeletal system, heart, lung, livers and kidney are the most common locations among Iranians, some unusual locations were documented in previous reviews on hydatid cysts such as the spleen, appendix, thyroid, adrenal gland, salivary gland, breast, ovary and pancreas. Hydatidosis is an endemic disease in Iran and the disease has been reported throughout the country. According to previous studies, the estimated prevalence was 5%, and is more frequent in women and older patients [8]. In addition, reports have shown that in different parts of Iran the contamination rate and incidence of hydatidosis are estimated at 0.6-1.2 per 100,000 individuals. The most affected areas in Iran were reported to be Tehran, Khorasan, Azerbaijan, Fars, Isfahan, and Yazd. However, in the past few years due to the lack of comprehensive studies, more updated data is lacking. Overall, the annual incidence rate of hydatid cyst in humans in Hamedan is 1.33/100,000 people, Babol 1.18, Kashan 3, and throughout Iran 0.61/100,000. Regarding age distribution, a wide range of patients with different ages have been reported, but the overall range was 20-40 years old. The following are numbers of patients who were diagnosed with hydatid cysts in different locations of their bodies. Regarding the central nervous system, in the last 20 years, 256 cases of hydatid cysts have been reported in the brain, spinal cord, and orbit of the eye. Cysts have been documented in the musculoskeletal system of 44 patients, in the cardiovascular system of 42 cases, in the kidney and urinary tract of 31 cases, 20 cases in the spleen, 9 cases in the uterus, ovary, and fallopian tube, 6 cases in the pancreas, 9 cases in the salivary gland, 8 cases in the breast, 4 cases in the thyroid, 2 cases of the adrenal, one case of the appendix, 7 cases in the mediastinum, and 7 cases of omentum and retroperitoneum in Iran. In a study between 1982-1992 in Hamedan province (in the west of Iran) totally 55 published cases of human hydatidosis have been reported, while, from 1999 to 2006, 179 cases have been observed in Iran. Yet, it is unknown whether the lack of facilities or the fast spread of infection caused the increasing number of hydatid cysts in Iran. According to a study, between 2001 to 2005, 2083 cases of hydatidosis have been reported in Iran. Laboratory diagnosis methods are CT-scan, MRI, X-ray, ELISA, but the challenge is to diagnose the acute form of the disease and following the patient after treatment. The key to the successful management of

hydatid cysts is early diagnosis of the disease by serology or imaging techniques, medical and surgical intervention. The interesting fact is that 96% of the cases of hydatidosis showed a positive reaction to the immunofluorescence antibody. New studies have shown that human hydatidosis has decreased from 0.72/10,000 to 0.54 in the course of four years. Estimating the economic impact of a disease is a way to quantify the importance and significance of diseases in human and livestock populations. The annual cost of human cystic Echinococcosis in Iran estimated at US\$232.3 million including both direct and indirect costs and for livestock with this parasitic infection estimated at US\$132.0 million. Hydatidosis is a serious public health problem in Iran and the existence of very young children with a hydatid cyst showed that the disease is being actively transmitted. A study was carried out in Children Medical Center Hospital in Tehran. Between 1995 to 2005, among 71,600 patients, 31 patients were diagnosed with hydatidosis. The majority of these child patients were male with an average age of eight years old. Almost all of the patients have shown a history of direct or indirect contact with livestock such as sheep or dogs. The most frequent organ that infected in children was lung, contrary to adults that the affected organ was liver. The major proportion of patients had a hydatid cyst in single organs and multiple cysts in a single organ were observed in 22.5% of the patients. Livestock cystic Echinococcosis (CE) cases have been reported to be between 5% and 45% in dogs in different provinces of Iran. Different areas of Iran have shown a high prevalence of infection with different strains of *E. granulosus* including sheep, goats, cattle, buffalo, and camels. In a study conducted on 16 isolates of *E. granulosus*, researchers found that in endemic areas of Iran the majority of *E. granulosus* that infected livestock could cause human infection as well. Each year damage to organs, especially livers and lungs, due to infection with this parasite cause significant costs on the health care system [10]. According to an article, Gilan and Mazandaran provinces have the highest rate of Echinococcus infection in livestock because of humid weather, whereas, Yazd and Kerman provinces, with hot and dry climates, have the lowest rate of hydatidosis [6]. Evidences from the Veterinary Helminthology book (written by A. Eslami) suggests that eggs of Echinococcus can survive in the shade and in humid environments for up to two years but they are destroyed in dry locations and under sun's radiation in a few hours or two days [6]. In "Parasitic Diseases in Iran", a book written by Dr. Saebi, infection in sheep is variable between 1-7% and Fars province is the most infected area [6]. In a comprehensive new study, it was reported that the average infection rate in livestock in Iran is 6.73% where the highest rate belonged to Khorasan and the lowest rate has been reported from Yazd. Although the public health authorities in Iran have established a monitoring system, in Muslim countries where religious ceremonies entail the sacrifice of livestock, the spreading risk of disease is still a challenge. Present studies believe that the infection rate in male dogs is higher than females with rates of 61.5% and 38.5% respectively. The dominance of male dogs or their hunting habits is two possible reasons behind this finding. Another study was conducted with 5381 different animals (928 cattle, 243 buffaloes, 3765 sheep and 445 goats) in the northwest of Iran. This area is one of the most important parts of Iran in breeding

livestock. To observe the possible presence of Echinococcosis, they considered the kind of animals, their sex, infected organ, and the number of cysts. The degree of the infection was divided into two categories: a mild infection (1-10 cysts) or severe infection (more than 10 cysts). The highest prevalence of hydatidosis has been reported in sheep with 74.4% and the lowest was seen in buffaloes with 11.9%. While most animals such as cattle, buffaloes, and sheep have shown cystic Echinococcosis in their lungs, goat's hydatid cysts are most commonly found in the livers. Data has shown a considerable seasonal pattern for hydatidosis in sheep and the highest prevalence rate was in autumn and winter. Serum samples of 670 cases with human hydatidosis have been collected from clinical and health centers in Meshkinshahr, Ardabil province. The prevalence of hydatid cyst in females was 1.68% and 2.6% in males by ELISA test. This study proves that the prevalence of hydatidosis in Meshkinshahr is less than provinces like Zanjan, Kurdistan, Kashan, Golestan, Khuzestan, Tehran, and Chaharmahal va Bakhtiyari, but higher than Ilam. Records of, 1342 patients enrolled in a study in Mashhad, the northeast of Iran were evaluated. Among these cases from Qaem, Emam Reza and 22 Bahman hospitals, 711 of patients were female and 631 of them were male. The homemakers were the most affected individuals with cystic Echinococcosis. The highest annual rate belongs to 2011 and the lowest rate was seen in 2009. The most affected organ in this area was the liver. Human hydatidosis has tended to increase in recent years and the programs to control or prevent this disease have been recommended. For example, personal hygiene could prevent the ingestion of infective eggs from soil contaminated with dog's feces.

CONCLUSION

Hydatid cyst is a serious and fatal infection disease, which is endemic in Iran. Because of the endemicity of hydatidosis, it should be considered as a dilemma in terms of health policy. This zoonotic disease can be present in any part of the body as cysts particularly in the liver and lungs and it has been observed

in many cities of Iran [13]. Echinococcus can infect both humans and animals by transmitting into their bodies [10]. However, by public education, enhancing the healthcare system [8], improving the mechanism of slaughterhouses specifically in rural areas, and improving facilities we can control and prevent the disease .

References

1. Rahmanpour. A, Davoodi. J, DastooriDastgir. S. "Seroepidemiological study of Human Hydatid Cyst in AbharCity-Zanjan Province by ELISA test in 2014". Zanko Journal of Medical Science.Kurdistan Medical Science University. 2018; 75-84.
2. VahedianArdakani, J. "The presence of Hydatid Cyst as Infectious Skin Abscess; Case Report".Kerman Journal of Medical Science. 1995; 3(1): 55-58.
3. Centers for Disease Control and Prevention. "Cystic Echinococcosis (CE)". 2012.
4. Hamzavi. Y, Nazari. N, Micaeili. A, Parandin. F, Feizi. F, Sardari. M. (2016). "The Infection Rate of Hydatid Cyst in Slaughtered Livestock in a Slaughterhouse in Asadabadbetween 2014- 2015". Pajoohan Scientific Journal, 14(3). 58-66
5. Moazeni. M.. "Other Countries Experience in Prevention of Hydatid Cyst". Tehran Journal of Medical Science. 2007; 1(2): 11-19.
6. Bokaei. S, AghazadehSanaei. S, Sharifi. L, Hoshmand. B, Nadim. A."The Ecological Study Hydatidosisin Human, Sheep, and Goat in Iran".Veterinary Journal of Garmsar Islamic Azad University. 2008; 4(1).
7. Moradi. H, Maroufi. Y, Dabirzadeh. M.. "Seroepidemiology of Human Hydatid Cyst in Shahrehabak Using ELISA".Mazandaran Journal of Medical Science. 2015; 25(133):315-318.
8. Abdulaziz. M, Almulhim; Savio John.. "EchinococcusGranulosus (Hydatid Cysts, Echinococcosis)".National Center for Biotechnology Information. 2019.
9. World Health Organization (WHO).. "Echinococcosis". 2019.
10. Mahmoudi. S, Mamishi. S, Banar. M, Pourakbari. B, Keshavarz. H.. "Epidemiology of echinococcosis in Iran: a systemic review and meta-analysis". BMC Infectious Disease . 2019; 19:929.