

# Infection Status of Hydatid Cysts in Humans and Sheep in Uzbekistan

Sung-Tae Hong<sup>1,\*</sup>, Yan Jin<sup>1</sup>, Khikmat Anvarov<sup>2</sup>, Abdulkhakim Khadjibaev<sup>2</sup>, Samin Hong<sup>3</sup>, Yusufjon Ahmedov<sup>4</sup> and Utkir Otaboev<sup>5</sup>

<sup>1</sup>Department of Parasitology and Tropical Medicine, Institute of Endemic Diseases, Seoul National University, College of Medicine, Seoul 110-799, Korea; <sup>2</sup>Department of Surgery, Republican Research Center of Emergency Medicine, Tashkent 100107, Uzbekistan; <sup>3</sup>Department of Coloproctology, Yang Hospital, Seoul 134-814, Korea; <sup>4</sup>Department of Surgery, Republican Research Center of Emergency Medicine Samarkand Branch, Samarkand, Uzbekistan; <sup>5</sup>Gospona Boraki Co. Tashkent, Uzbekistan

**Abstract:** Uzbekistan is endemic of cystic echinococcosis (CE). In order to estimate endemicity of CE, we collected data from emergency surgery due to CE in 2002-2010 and also investigated the prevalence of hydatid cysts in the liver and lungs of sheep at an abattoir in Uzbekistan from July 2009 to June 2010. In 14 emergency hospitals, 8,014 patients received surgical removal or drainage of CE during 2002-2010, and 2,966 patients were found in 2010. A total of 22,959 sheep were grossly examined of their liver and lungs, and 479 (2.1%) and 340 (1.5%) of them were positive for the cyst in the liver and lungs, respectively. *Echinococcus granulosus* is actively transmitted both to humans and sheep, and CE is a zoonotic disease of public health priority in Uzbekistan.

**Key words:** *Echinococcus granulosus*, emergency surgery, sheep, Uzbekistan

Cystic echinococcosis (CE) is a global zoonotic larval tapeworm disease which is caused by the hydatid cyst of *Echinococcus granulosus*. The human is infected as an intermediate host of *Echinococcus granulosus*. The major mode of human infection is ingestion of its eggs by direct fecal contact of infected dogs or eating contaminated food or water [1]. Human infection is known as CE with other names of hydatid disease or hydatidosis. Human CE occurs mainly in the liver and lungs [2]. Therefore, the liver and lungs are major target organs of the disease screening. However, most of CE patients have no symptoms at the early stage of infection, and realize its subjective symptoms suddenly when the cyst is big or complicated. In such a circumstance, most of CE patients require emergency intervention. It is difficult to screen or estimate the symptomless infected people before appearance of the emergent medical episode even in endemic areas.

Several parameters are used instead to evaluate endemicity or disease occurrence in an endemic area. They are annual in-

cidence of patients, infection rate of sheep or other mammals, and infection rate of dogs. Each parameter suggests its epidemiological significance for echinococcosis transmission in a certain area [2-4]. Uzbekistan is known endemic of CE with other middle Asian or Mediterranean countries [3]. Official reports figured 1,435 human cases in 2000 and 819 in 2001 in whole Uzbekistan, and the sheep were reported with high positive rates about 60% at the same time [3]. In order to investigate recent disease burden of CE in Uzbekistan, we collected patient data from the national networked hospitals of the Republican Research Center of Emergency Medicine in 2002-2010. Also all of the sheep were monitored of the hydatid cyst in their liver and lungs at an abattoir in Tashkent, the capital of Uzbekistan, from July 2009 to June 2010.

In the 14 networked emergency medicine hospitals, a total of 8,014 patients received surgical intervention of CE during 2002-2010 (Table 1). All of them were diagnosed and treated under emergency condition. Since Uzbek surgeons are familiar with CE management, the number of patients could be a nearly real estimation, confirmed and managed by the 14 emergency hospitals. The true national figure of clinical CE patients must add numbers of CE patients cared by other hospitals to the 8,014 patients.

Sheep are slaughtered every day in Tashkent. A total of 22,939

•Received 26 March 2013, revised 18 April 2013, accepted 22 April 2013.

\*Corresponding author (hst@snu.ac.kr)

© 2013, Korean Society for Parasitology and Tropical Medicine

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Table 1.** Numbers of surgical CE patients by the Republican Research Center of Emergency Medicine branches in 14 states of Uzbekistan, 2002-2010

State of Uzbekistan	No. of patients by year									
	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Tashkent	30	80	56	81	136	285	146	128	122	1,064
Andijan	44	57	70	75	88	80	77	64	87	642
Bukhara	-	15	16	35	35	37	39	44	47	268
Jizzak	78	65	67	76	83	92	79	91	81	712
Kashkadarya	-	90	77	91	83	133	111	97	65	747
Navoi	63	92	89	90	99	83	106	96	101	819
Namangan	-	62	49	47	88	77	69	33	50	475
Samarkand	-	51	61	91	106	91	121	112	103	736
Surkhandarya	-	77	49	50	58	56	51	57	53	451
Sirdarya	71	114	140	97	62	107	132	74	99	896
Tashkent Suburbs	-	-	-	-	-	-	-	11	17	28
Fergana	19	23	49	52	74	95	62	60	52	486
Khorezm	105	79	77	42	16	33	57	54	55	518
Karakalpakstan	9	6	8	15	41	23	24	22	24	172
Total	2,421	2,814	2,812	2,847	2,975	3,199	3,082	2,952	2,966	8,014

heads were slaughtered and grossly screened of their liver and lungs after devisceralization by a veterinarian. The hydatid cyst was recovered from the liver of 479 (2.1%) and from the lungs of 340 (1.5%) sheep, and total 819 (3.6%). Some of the sheep were infected both in the liver and lungs, and also other organs, but those details were not considered in this screening.

The Republican Sanitation and Epidemiology Center of Uzbekistan is officially monitoring and reporting patient numbers based upon reports from the 14 State Sanitation and Epidemiology Centers. The official data reported 1,438 cases in 1998, 1,435 in 2000, and 819 in 2001 [3]. The data were official numbers of CE patients in Uzbekistan, but they must have been underestimated. That is because only a part of the patients of emergency hospitals or other hospitals who were recognized at the local township health centers were included in the data. Many of them were dropped due to no collaboration system between the hospitals and the state Sanitation and Epidemiology Centers. The figure of 2,966 patients in 2010 was the minimum confirmed number of CE in Uzbekistan in the year. Furthermore, symptomless patients of early CE (ECE) must be much more than the confirmed figure. Some of ECE cases may become overt emergency patients after several years but some are not [5]. Torgerson et al. [3] suggested 3 times of more patients than that of official report in Uzbekistan. Since the official report counted about 1,000 cases in a year, the real number of cases were suggested about 3,000 and total 12,520 cases were estimated [3]. However, the network hospitals of emer-

**Table 2.** Number of patients who received surgery of cystic echinococcosis in the Republican Research Center of Emergency Medicine, Samarkand Branch, 2005-2010

Clinical types of echinococcosis	No. (%) of patients <sup>a</sup>
Hepatic	336 (69.0)
Pulmonary	107 (22.2)
Abdominal	18 (3.7)
Splenic	8 (1.7)
Cerebral	7 (1.5)
Back subcutaneous	5 (1.0)
Total	481 (100)

<sup>a</sup>Only the patients with clinical information of organ involvement were included.

gency medicine recognized about 3,000 patients every year. There are many other hospitals which can take care of CE in whole country. Therefore, if we suppose that the transmission of *E. granulosus* is in an epidemiologically stable natural equilibrium, newly infected cases must be far more than 3,000 every year in Uzbekistan. The real population of patients must be much more than 12,520 because every infected patient carries the CE for several years without symptoms.

When a patient of ECE is diagnosed, he or she can be treated medically [1]. However, it is difficult and impractical to detect symptomless ECE. If a system for diagnosis of ECE is established, emergency surgical intervention could be reduced in Uzbekistan. The system should be supported by both serodiagnostic test and radiological or ultrasound images [1,6]. The serodiagnostic system using ELISA is essential and critical for

upgraded management of both CE and ECE [7,8].

The Republican Research Center of Emergency Medicine Samarkand Branch summarized records of CE patients by the involved organs (Table 2). The liver (69.0%) and the lungs (22.2%) were commonly involved, and 7 (1.5%) were cerebral CE. Other organs were involved but not frequently. Multiorgan infection might have been but not specified in this summary. The findings by organs were same in general as previously described [1,2].

Between 1990 and 2002, the sheep was reported with cyst positive rates from 45.1% to 62.2% in Uzbekistan [3]. Also high rates of cattle (24.3-45.5%), pigs (6.0-8.0%), camels (25.4-35.0%), and donkeys (32.0-38.5%) were reported positive [3]. Our positive rate of 3.6% was much lower than that of the previous report. At present, it is not easy to explain the big difference. Just it is inferred that our study examined all sheep at an abattoir in Tashkent for one year while the previous ones were sampled in most hyperendemic local regions. It is difficult to directly compare data of separate studies of different locality, sampling, and timing. Although the positive rate was 3.6%, it is an enough evidence of active transmission of *E. granulosus* in Uzbekistan.

The infection rate of dogs is another important parameter in epidemiology because the dogs seed eggs of *E. granulosus*, and the eggs from them are infecting humans and sheep. The dogs were reported as 7.9% positive among village dogs and 20.1% among farm dogs in Uzbekistan [3]. The population of infected dogs in a community should be estimated to monitor accurately the infection force of *E. granulosus*. Since Uzbekistan is the most frequent country of imported CE cases in Korea, accurate and updated epidemiological parameters are required for proper management of the disease [9].

In conclusion, the 8,014 emergency patients in 2002-2010 confirm that CE is an important infectious disease in Uzbekistan. Also the infection rate of 3.6% among sheep is an evidence of active transmission of *E. granulosus* between sheep and dogs. CE is a helminthic zoonosis of public health priority in Uzbekistan.

## REFERENCES

1. Moro P, Schantz PM. Echinococcosis: a review. *Int J Infect Dis* 2009; 13: 125-133.
2. da Silva AM. Human echinococcosis: a neglected disease. *Gastroenterol Res Pract* 2010; 2010. doi:pii: 583297.10.1155/2010/583297.
3. Torgerson PR, Oguljahan B, Muminov AE, Karaeva RR, Kuttubaev OT, Aminjanov M, Shaikenov B. Present situation of cystic echinococcosis in Central Asia. *Parasitol Int* 2006; 55: S207-S212.
4. Cardona GA, Carmena D. A review of the global prevalence, molecular epidemiology and economics of cystic echinococcosis in production animals. *Vet Parasitol* 2013; 192: 10-32.
5. Brunetti E, Garcia HH, Junghanss T. International CE Workshop in Lima, Peru, 2009. Cystic echinococcosis: chronic, complex, and still neglected. *PLoS Negl Trop Dis* 2011; 5: e1146.
6. Nunnari G, Pinzone MR, Gruttadauria S, Celesia BM, Mededdu G, Malaguarnera G, Pavone P, Cappellani A, Cacopardo B. Hepatic echinococcosis: clinical and therapeutic aspects. *World J Gastroenterol* 2012; 18: 1448-1458.
7. Zhang W, McManus DP. Recent advances in the immunology and diagnosis of echinococcosis. *FEMS Immunol Med Microbiol* 2006; 47: 24-41.
8. Jin Y, Hong S, Anvarov K, Khajibaev A, Hong ST. Serodiagnosis of echinococcosis by ELISA using cystic fluid from Uzbekistan sheep. *Korean J Parasitol* 2013; 51: 313-317.
9. Ahn KS, Hong ST, Kang YN, Kwon JH, Kim MJ, Park TJ, Kim YH, Lim TJ, Kang KJ. An imported case of cystic echinococcosis in the liver. *Korean J Parasitol* 2012; 50: 357-360.