

Abdominal cystic echinococcosis in Bangladesh: a hospital-based study

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Abstract

Introduction: Cystic echinococcosis (CE) is reported from nearly all geographic areas of Bangladesh, but little information is available on its epidemiologic and clinical features. The aim of this study was to describe the clinical manifestations of hepatic and abdominal CE cases presenting to tertiary referral hospitals in Dhaka, Bangladesh.

Methodology: A retrospective study was conducted via chart reviews of hepatic and abdominal CE patients under care at tertiary referral hospitals in Dhaka, Bangladesh, between 2002 and 2011. Age, sex, education level, occupation, urban versus rural residence, drinking water source, history of dog ownership, cyst type and location, and clinical manifestations were recorded for all patients.

Results: Of the 130 patients enrolled, 92 (70.8%) were female and 38 (29.2%) were male. The majority of patients were from rural (76.2%) rather than urban (23.8%) areas. All cases were from the northern part of the country, with no cases reported from the south or southeast. Most patients were between 21 and 40 years of age. A total of 119 patients (91.5%) had cysts only in the liver, with the remaining 8.5% having cysts in both the liver and lungs or in the abdominal cavity. Seventy-six (58.5%) of the hepatic cysts were stage CE1, indicating recent infection.

Conclusions: Active transmission of *Echinococcus granulosus* appears to be occurring in Bangladesh, as indicated by the high number of CE1 hepatic cysts seen at tertiary care hospitals. Community ultrasound screening studies are warranted to better define the distribution of cases and risk factors for parasite transmission.

Key words: cystic echinococcosis; hydatid disease; epidemiology; clinical presentation; ultrasound classification; Bangladesh.

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Introduction

Cystic echinococcosis (CE), caused by the larval stage of the cestode *Echinococcus granulosus*, is among the most widespread parasitic zoonoses, with transmission occurring in tropical and temperate regions. The parasite occurs mainly in sheep-grazing areas, where dogs act as definitive hosts and sheep and other livestock act as intermediate hosts [1]. CE may develop in humans after accidental ingestion of tapeworm eggs excreted with the feces of an infected dog [2].

Cases of human CE are not as well reported in Bangladesh as in some other endemic areas [3]. However, a number of studies have revealed CE to be a problem in local cattle [3-5]. In a 2010 study, the CE prevalence in slaughtered animals (cattle, sheep, and goats) was 26% in the Comilla (90 km from Dhaka) and Brahman Baria (100 km from Dhaka) regions of Bangladesh [6]. Additional studies have reported prevalences ranging from 17.2% to 29.6% in cattle [7-9]. A study of *E. granulosus* infection in stray dogs in Bangladesh revealed an average prevalence of

62.5%, with prevalences up to 75.8% recorded in dogs in and around slaughterhouses [5].

While there have been a number of animal studies, little information is available about the prevalence of CE in humans in Bangladesh. The number of dogs owned, frequency of contact with dogs, feeding of dogs with infected offal, allowing dogs to roam free, infrequent administration of praziquantel to dogs, and contaminated sources of drinking water have all been reported as possible risk factors for *E. granulosus* transmission [1,2,10]. The objective of this study was to describe the clinical features of hepatic and abdominal CE patients treated in referral hospitals in Dhaka, Bangladesh.

Methodology

Study area

Bangladesh is a small country (147,570 sq km) in Southeast Asia that is bordered by India and Myanmar. The country is situated in the Ganges Delta, with hilly areas in the northeast and southeast regions. It is a densely populated country, with farming being the main source of income for the rural population. In 2012, per capita income was approximately US \$848 [11].

Study design

The medical records of inpatients treated for hepatic and abdominal CE at Bangabandhu Sheikh Mujib Medical University, Dhaka Medical College Hospital, Sir Salimullah Medical College, and Mitford Hospital between 2002 and 2011 were retrieved. The participating medical centers are located in Dhaka, Bangladesh, and are considered tertiary care facilities to which patients from all regions of the country are referred.

A diagnosis of CE was based on abdominal ultrasound, clinical features, and serology. The cysts were staged according to the World Health Organization International Working Group on Echinococcosis (WHO-IWGE) standardized classification for ultrasound (US) [12]. Cysts were further evaluated by computed tomography (CT) when the exact localization of the cyst was unclear on ultrasound alone. Serological diagnosis was conducted using an indirect hemagglutination assay (IHA) (Echinococcosis-Fumouze Laboratories, Levallois-Perret, France). A data collection form was developed to record the patient's age, sex, education level, occupation, rural or urban residence, and history of dog ownership.

Ethical considerations

The study protocol was reviewed and approved by the Review Board of the Department of Hepatology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

Results

Patient demographics are presented in Table 1. All patients treated for CE in the Medicine and Hepatology Units of the participating hospitals were enrolled in the study. Of the 130 patients enrolled, 92 (70.8%) were female and 38 (29.2%) were male. The mean age of CE cases was 38.7 years, with a standard deviation of 17.1 years. Housewives (50.0%) made up the largest group of patients. Other represented groups included students (16.7%), salaried employees (16.7%), farmers (10.0%), and retirees (6.7%). A greater number of patients originated from rural areas (76.2%) than from urban areas (23.8%). All cases were from the northern part of the country, with no cases reported from the south or southeast. The majority of patients came from Gazipur, which is a region located 40 km north of the capital city Dhaka (Table 2, Figure 1).

Most of the patients had cysts only in the liver (91.5%), with the remainder having cysts in both the liver and lungs (6.9%) or in the abdominal cavity (1.5%). The majority of cysts were CE1 (58.5%), followed by CE2 (30.7%), CE3a (3%), CE3b (2.3%), and CE4 (2.3%). All lung cysts were classified as CE1 (Figure 2). Patients with abdominal cysts presented primarily with abdominal pain (87.5%) or abdominal swelling (46.4%). Chest pain and/or cough were present in the nine patients with pulmonary cysts as well as in two patients with only hepatic cysts. Fever was present in 23 (17.9%) cases, which were all found to have infected cysts during treatment with the puncture, aspiration, injection, re-aspiration (PAIR) procedure or upon cyst content aspiration independent of PAIR.

Discussion

To our knowledge, only a few case reports on human CE from Bangladesh are available in the English language literature [13-16], and they are mostly about sites where CE occurs rarely (spine, brain, kidney), which are thought to constitute a small proportion of the total cases [17]. The current study is more comprehensive and includes all patients presenting as inpatients with hepatic and/or abdominal CE to the main tertiary care facilities in Bangladesh.

Table 1. Demographics of patients presenting with hepatic or abdominal cystic echinococcosis (CE) in Bangladesh

Number of patients	130
Sex	
Male	38 (29.2%)
Female	92 (70.8%)
Age	
7–20 years	14 (10.7%)
21–40 years	58 (44.6%)
41–60 years	37 (28.6%)
61–80 years	21 (16.1%)
Education	
No schooling	18 (13.8%)
Completed primary school	40 (30.8%)
Completed secondary school	45 (34.6%)
Completed high school	27 (20.8%)
Occupation	
Housewife	65 (50.0%)
Student	22 (16.7%)
Salaried employee	22 (16.7%)
Farmer	12 (10.0%)
Retiree	9 (6.7%)
Water source	
Well water	99 (76.1%)
Tap water	31 (23.9%)
Rural/urban background	
Rural background	99 (76.1%)
Urban background	31 (23.9%)
Clinical manifestations	
Abdominal pain	114 (87.5%)
Abdominal fullness/lump	60 (46.4%)
Chest pain and/or cough	14 (10.7%)
Fever	23 (17.9%)
History of dog ownership	
Present	51 (39.2%)
Absent	79 (60.7%)
Number of cysts	
One	95 (73.0%)
Two	25 (19.2%)
Three or more	10 (7.7%)
Size of cyst	
Range	4.2–17.3 cm
Mean	9.6 cm
Stage (WHO-IWGE standardized classification)	
CE 1	76 (58.5%)
CE 2	40 (30.7%)
CE 3a	7 (5.3%)
CE 3b	4 (3.0%)
CE 4	3 (2.3%)
Organ involved	
Liver only	119 (91.5%)
Liver and lung	9 (6.9%)
Other organ (ovary, abdominal)	2 (1.5%)

Table 2. Home sub-districts for referred cystic echinococcosis (CE) cases

Dhaka division	
Bhaluka	3
Dhaka	16
Dohar	3
Gazipur	23
Kishorganj	3
Manikganj	2
Mymensingh	5
Narayanganj	5
Narsinghdi	2
Nawabganj	2
Tangail	3
Sylhet division	
Sylhet	6
Chittagong division	
Comilla	2
Chandpur	3
Khulna division	
Jhinidaha	4
Meherpur	2
Satkhira	3
Barisal division	
	No cases
Rajshahi division	
Bogra	2
Dinajpur	2
Jaipurhat	1
Kurigram	1
Pabna	10
Panchagarh	2
Rajshahi	3
Rangpur	9
Ranishangkail	1
Sirajganj	10
Syedpur	2

Figure 1. Reported cases of cystic echinococcosis (CE) from Bangladesh

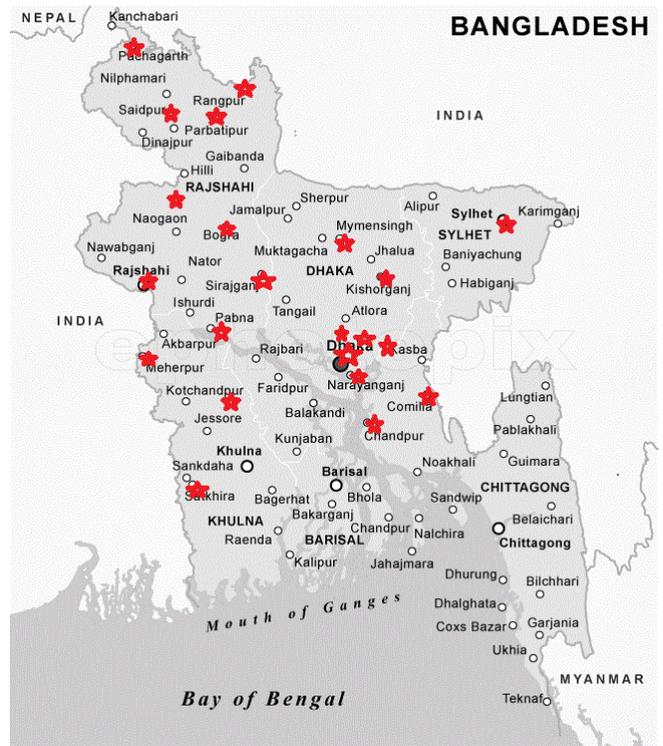
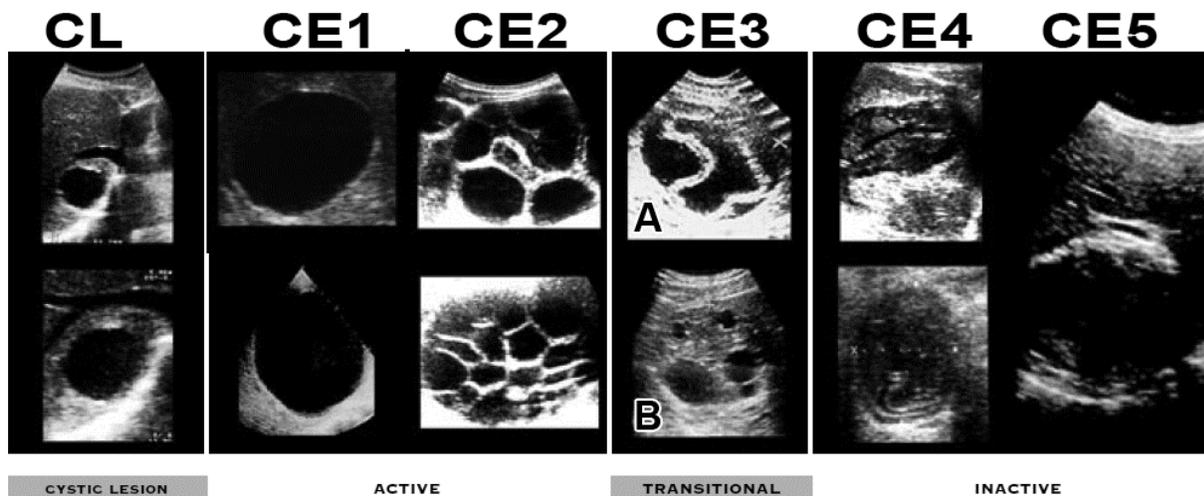


Figure 2. WHO-IWGE classification of ultrasound images of cystic echinococcosis (CE) cysts



Active transmission of *E. granulosus* is occurring in Bangladesh, as indicated by the high number of CE1 cysts in the study patients. The geographic variation in patient origin may be due to residents in the southern part of the country tending to have poorer healthcare facilities and often seeking treatment from traditional healers. Therefore, the importance of CE in southern Bangladesh may be underestimated by the current study. The majority of the patients in this study came from Gazipur, which is a semi-urban area that is still largely dependent on small-scale agriculture.

Cattle, buffalo, sheep, and goats are the most important livestock in Bangladesh, where they supply meat and milk to the population. In Bangladesh, cows, sheep, and goats are frequently slaughtered in the open, and abattoir oversight is unsatisfactory. In many abattoirs and village markets, animals are slaughtered with no veterinary supervision. Dogs often gather around abattoirs and become infected with *E. granulosus* when they feed on discarded offal. Although there are laws requiring veterinary inspection and forbidding slaughtering of animals in open spaces, these laws are not enforced. As a result, CE has many economic, public health, and environmental implications [18].

The epidemiology of *E. granulosus* in Bangladesh is most likely similar to neighboring countries such as India, where small-scale agriculture still predominates in rural and semi-urban areas. While domestic dogs are the predominant definitive hosts for *E. granulosus*, less than 40% of the patients in the current study had a history of dog ownership. This indicates that indirect modes of transmission may be responsible for some infections. Stray dogs are common in the region, resulting in widespread contamination with feces from potentially infected free-roaming dogs. Transmission may then result via contact with contaminated plants or soil followed by direct hand-to-mouth transfer [19]. Contaminated water may also play a role in parasite transmission; over three-quarters of the patients in the current study reported getting their water from a well rather than from a piped supply. Monitoring of the dog population, dog deworming, improvement of slaughtering procedures and destruction of infected viscera, health education, and interdisciplinary cooperation are all measures that can help reduce the transmission of *E. granulosus* locally.

While this study is more comprehensive than previous reports on human CE in Bangladesh, it does have a number of limitations. For example, the retrospective nature of the study means that findings are largely dependent on the completeness of available

records. In addition, the current study is purely descriptive in nature and does not allow for assessment of the prevalence or incidence of CE cases in the study area. That said, the presented findings indicate a need for ultrasound screening studies in areas with known human cases. Based on the findings of these community-based studies, implementation of control programs should be considered by policymakers.

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