

A retrospective hospital study of human cystic echinococcosis in Egypt

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دراسة عن داء الكيسات المائية لدى البشر: دراسة استيعادية في المستشفيات
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الخلاصة: قام الباحثون بدراسة استيعادية للتعرف على معدل الوقوع السنوي لداء الكيسات المائية السريري (الإكلينيكي) في 14 من المستشفيات المصرية، في الفترة بين كانون الثاني/يناير 1997 وكانون الأول/ديسمبر 1999. ومن بين السجلات التي فُحصت والبالغ عددها 492 353 سجلاً، تم العثور على 133 سجلاً تمثل 0.027% من حالات داء الكيسات لدى البشر، ومن بين هؤلاء كان 50 حالة (37.6%) من مستشفيات الإسكندرية ومطروح، و33 حالة (24.8%) من مستشفى الجيزة للصدر، و50 حالة من مناطق أخرى. وقد كان لدى محافظة مطروح أعلى معدل سنوي للوقوع السريري، إذ تراوح بين 1.34 و2.60 لكل مئة ألف من السكان، تلاها محافظة الجيزة، حيث تراوح المعدل فيها بين 0.80 و1.16 لكل مئة ألف من السكان. وقد كان العمر في ثلث المصابين يقل عن عشرين عاماً، وكانت أكثر الأعضاء إصابة هي الكبد والرئتان. وتدل الدراسة على أنه بالرغم من أن داء الكيسات المائية ذو توطن منخفض في مصر، فإنه قد يمثل إحدى مشكلات الصحة العمومية في محافظتي الجيزة ومطروح.

ABSTRACT We performed a retrospective study to determine annual clinical incidence of human cystic echinococcosis (CE) in 14 Egyptian hospitals between January 1997 and December 1999. From 492 353 records examined, 133 (0.027%) new human CE cases were recorded. Of these, 50 (37.6%) were from Alexandria and Matrouh hospitals, 33 (24.8%) from Giza Chest Hospital and 50 from other regions. Matrouh governorate had the highest annual clinical incidence (1.34–2.60 per 100 000) followed by Giza governorate (0.80–1.16 per 100 000). About a third of those affected were aged ≤ 20 years. Liver and lungs were the organs most affected. Although human CE is of low endemicity in Egypt, it may represent a public health concern in Matrouh and Giza governorates.

Etude hospitalière rétrospective de l'échinococcose kystique humaine en Egypte

RESUME Nous avons réalisé une étude rétrospective dans 14 hôpitaux égyptiens entre janvier 1997 et décembre 1999 afin de déterminer l'incidence clinique annuelle de l'échinococcose kystique humaine. Parmi les 492 353 dossiers examinés, 133 (0,027 %) nouveaux cas d'échinococcose kystique humaine ont été recensés. Cinquante (50) de ces cas (37,6 %) ont été enregistrés dans les hôpitaux d'Alexandrie et de Matrouh, 33 (24,8 %) à l'hôpital cardiopulmonaire de Giza et 50 dans les hôpitaux d'autres régions. Le Gouvernorat de Matrouh avait la plus forte incidence clinique annuelle (1,34-2,60 pour 100 000) suivi par le Gouvernorat de Giza (0,80-1,16 pour 100 000). Environ un tiers des personnes affectées étaient âgées de 20 ans ou moins. Le foie et les poumons étaient les organes les plus touchés. Bien que l'Egypte soit un pays de faible endémicité de l'échinococcose kystique humaine, cette maladie peut représenter une préoccupation de santé publique dans les gouvernorats de Matrouh et de Giza.

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Introduction

Human cystic echinococcosis (CE) (cystic hydatidosis) is a chronic zoonotic disease that results from infection with the larval stage of the dog tapeworm, *Echinococcus granulosus*. The disease is highly endemic in most of the countries of the Mediterranean basin, including North Africa and the Middle East [1,2]. It has been reported as an important public health problem in Jordan, Libyan Arab Jamahiriya, Morocco, Tunisia, and Israel [3–7]. Thus, Egypt is surrounded by countries endemic for CE, and several publications have recognized the existence of human CE cases among Egyptians [8–10]. Furthermore, CE has been documented by veterinarians in slaughtered camels (4.3%) and sheep (0.33%) in Egyptian abattoirs [11,12]. There is, however, little medical awareness or information regarding the endemicity of human CE in the country.

In human CE, the liver is the main organ affected, followed by lung tissue, however, there is usually no direct parasitological evidence for the presence of cysts in organs or tissues. Indirect methods of diagnosis are, therefore, important and include imaging for detection of a space-occupying mass and serological techniques which require improved clinical and laboratory facilities [13]. Patients with hepatic CE frequently exhibit no symptoms because of the slow progression of the cysts [2]; therefore, they may only be discovered accidentally and frequently have complicated forms of the disease. Pulmonary hydatidosis may be fortuitously revealed during thoracic radiography. Surgery, chemotherapy (or a combination of both) and the PAIR technique (puncture, aspiration, injection, reaspiration) are the main forms of treatment of human CE [14,15].

Cystic echinococcosis is a disease of people living in rural areas, where pastoral

livestock is predominant [10], but there appears to be no recognized area where CE transmission is intense in Egypt. Consequently, physicians in rural areas rarely consider CE in their differential diagnosis. Furthermore, medical administrations in rural areas are frequently inadequate and therefore consultation with experienced physicians is required. Cases with query diagnosis are usually referred to specialized Ministry of Health and Population (MOHP) hospitals or to major universities for conclusive diagnosis and intervention.

Accordingly, the objective of this retrospective study was to determine the annual clinical incidence of the disease in northern Egypt. In particular, we examined records in 14 hospitals, including university hospitals, MOHP specialized hospitals and referral hospitals covering the period January 1997 to December 1999.

Methods

The study was carried out at general and specialized hospitals of 3 universities (in Alexandria, Cairo and Giza governorates), the hospital of the Liver Institute (Menoufia University, in the Nile delta) and 10 MOHP hospitals (6 chest and 4 general referral). The MOHP hospitals are located in Cairo, the Nile delta, North Sinai, and Matrouh governorate in the north-western part of Egypt. We reviewed inpatient records from all sites for the period January 1997–December 1999. During the study period, with the exception of Kasr El Aini Hospital (Cairo University), none of the records were kept on computer, therefore, the medical records were searched manually by one of our teams. The review team consisted of a physician, who worked as project manager, along with 2 part-time health workers as reviewers. The physician was qualified for a minimum of 10 years.

Each reviewer screened sets of 50 notes under supervision until they were judged to be fully conversant with the review process. Records that were suspected for CE were then reviewed by clinicians, who verified the final diagnosis.

As mentioned above, diagnosis of CE is usually based on imaging techniques with serological confirmation, and surgery, chemotherapy and the PAIR technique are the main forms of treatment. Hence, the criteria we used to assess the case records were indicative imaging techniques (X-ray, ultrasound, CT scan or MRI) or positive serological tests (indirect haemagglutination or enzyme-linked immunosorbent assay), along with treatment of the case with chemotherapy (albendazole), surgery or PAIR, and histopathology records of cysts or aspiration fluid. Sex, date of admission, date and place of birth, cyst location, and whether the infection was new or recurrent were recorded for all CE cases. We maintained patient confidentiality by using initials only for individual identification. Multiple admissions for the same patient were identified from admission dates, initials, age, sex and only the first admission of such cases was included in the analysis.

Since it was not feasible to include all hospitals and clinics that perform thoracic and abdominal surgery in each region covered in the study, we adjusted the annual clinical incidence of recorded cases to estimate adjusted incidence. This was done by dividing the recorded CE cases by the number of beds in the hospitals we studied then multiplying the outcome by the total number of hospital beds in each governorate.

For example, in Matrouh governorate, we only screened patient records in 2 hospitals (Matrouh General Hospital and Matrouh Chest Hospital) which have a total of 386 beds. However, we added 117 beds to compensate for other hospitals and clinics

in the governorate that could specifically diagnose CE or perform surgery. In other words, beds in hospitals and clinics not involved with CE (e.g. psychiatry, maternity, child health) were excluded. Incidence was calculated as in the following example: for Matrouh governorate, 1997: 2 (no. of cases) divided by 386 (no. of beds in screened hospitals) multiplied by 503 (corrected no. of beds) = 2.6 cases. This figure was used to estimate the annual incidence, i.e. $2.6/194\ 019 \times 100\ 000 = 1.34$.

Results

A total of 492 353 patient files were examined and 133 accumulated new cases of human CE were recorded from 14 hospitals examined for the period January 1997 to December 1999 (Table 1). Giza Chest Hospital showed the highest CE rate for total admissions (0.096%–0.160%) followed by Menoufia Liver Institute (0.026%–0.088%).

Table 2 shows the estimated annual clinical incidence (per 100 000 population) of CE for each governorate, based on 2.1% annual growth rate of estimated resident population in 1996. Matrouh governorate had the highest annual incidence, followed by Giza governorate. The calculated rates for Matrouh governorate were significantly higher than Giza governorate in years 1998 (Matrouh 1.97/100 000, Giza 0.80/100 000; $\chi^2 = 7.27$, $P = 0.013$) and 1999 (Matrouh 2.60/100 000, Giza 1.00/100 000; $\chi^2 = 3.99$, $P = 0.040$). The estimated annual clinical incidence of CE did not differ significantly within each governorate from one year to another except in Cairo governorate, where the incidence increased significantly from 0.05/100 000 in 1997 to 0.27/100 000 in 1999 ($\chi^2 = 4.59$, $P = 0.03$).

Table 1 Identification of human hydatid cyst cases in records of 14 hospitals in Egypt during the period 1997–1999

Hospital name (geographical region)	Year	Total no. cases admitted	Hydatid cyst cases No.	%
Ain Shams University Hospital (Cairo)	1997	36 408	1	0.003
	1998	36 735	3	0.008
	1999	38 294	7	0.018
Kasr El Aini Hospital, Cairo University (Giza)	1997	50 001	10	0.020
	1998	51 573	9	0.017
	1999	52 019	5	0.010
Abassia Chest Hospital (Cairo)	1997	5 941	1	0.017
	1998	6 438	2	0.031
	1999	6 362	4	0.063
Giza Chest Hospital (Giza)	1997	7 492	12	0.160
	1998	7 255	7	0.096
	1999	8 781	14	0.159
Menoufia Liver Institute (Nile delta)	1997	3 402	3	0.088
	1998	3 867	1	0.026
	1999	4 112	3	0.073
Menoufia Chest Hospital (Nile delta)	1997	964	0	–
	1998	989	0	–
	1999	1 041	0	–
Alexandria University Hospital (Alexandria)	1997	26 451	13	0.049
	1998	27 447	12	0.044
	1999	27 297	16	0.059
Alexandria Chest Hospital (Alexandria)	1997	3 927	0	–
	1998	4 036	0	–
	1999	3 891	0	–
Matrouh General Hospital (north-west Egypt)	1997	8 649	2	0.023
	1998	7 976	3	0.038
	1999	8 685	3	0.035
Matrouh Chest Hospital (north-west Egypt)	1997	829	0	–
	1998	792	0	–
	1999	947	1	0.106
El Saloum General Hospital (north-west Egypt)	1997	731	0	–
	1998	694	0	–
	1999	674	0	–

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Table 1 Identification of human hydatid cyst cases in records of 14 hospitals in Egypt during the period 1997–1999 (concluded)

Hospital name (geographical region)	Year	Total no. cases admitted	Hydatid cyst cases	
			No.	%
El Suez General Hospital (eastern Egypt)	1997	4 752	1	0.021
	1998	5 016	0	–
	1999	4 421	0	–
North Sinai Hospital (north-east Egypt)	1997	10 922	0	–
	1998	10 241	0	–
	1999	10 789	0	–
North Sinai Chest Hospital (north-east Egypt)	1997	471	0	–
	1998	458	0	–
	1999	583	0	–
Total		492 353	133	0.027

All age groups and both sexes were well represented among patients with CE (Table 3). Approximately one third (45 cases) of the CE cases were ≤ 20 years of age. Of these, 19 (42.2%) were from hospitals in Giza governorate and 18 (40.0%) from hospitals in Alexandria and Matrouh governorates.

Of the 133 cases of human CE, 79 (59.4%) people had surgical interference. Of these, 18 (22.8%) cases had been confirmed pathologically. The remaining 54 (40.6%) cases received medical treatment; they were diagnosed based on serological tests and imaging techniques.

Hydatid cysts occurred most commonly in the liver and the lungs, either singly (54 and 52 respectively) or in conjunction with other organs (24 and 11 respectively). A total of 24 cases involved infection in > 1 organ (Table 4).

Discussion

Egypt is recognized to be endemic for parasitic diseases such as schistosomiasis, fi-

lariasis and amoebiasis. Cystic echinococcosis, however, is not currently a well-known medical condition, nor is it considered to be of public health importance; it is not a notifiable disease and there are no surveillance data available for the country. Our study was carried out to determine whether infection with CE represents a public health threat to residents of certain areas and to identify regions with high parasite transmission. Our data clearly confirm the low endemicity of the disease in northern Egypt, however the data indicate that the incidence of CE was relatively high in the western governorate of Matrouh, near the Libyan border, decreasing towards the east, and virtually disappearing in the most easterly parts of the country.

The calculated CE incidence for Giza governorate was unexpectedly high. Several factors could account for this finding. Firstly, major hospitals like Cairo University hospitals, located in Giza, do not just serve residents of Giza governorate: as there are no hospitals specialized in treating hydatidosis, patients seeking high quality

Table 2 Estimated annual clinical incidence (per 100 000 population) of cystic echinococcosis in 7 regions of Egypt

Governorate	Year ^a	Population ^b	Cases No.	Incidence
Matrouh	1997	194 019	2	1.34
	1998	198 181	3	1.97
	1999	202 432	4	2.60
Alexandria	1997	3 515 238	13	0.70
	1998	3 590 641	12	0.65
	1999	3 667 662	16	0.85
Menoufia	1997	2 683 728	3	0.83
	1998	2 741 295	1	0.27
	1999	2 800 097	3	0.80
Giza	1997	4 554 464	22	1.16
	1998	4 652 160	16	0.80
	1999	4 751 950	19	1.00
Cairo	1997	7 450 857	2	0.05
	1998	7 610 682	5	0.13
	1999	7 773 934	11	0.27
Suez	1997	394 063	1	0.40
	1998	402 516	0	–
	1999	411 150	0	–
North Sinai	1997	121 111	0	–
	1998	123 709	0	–
	1999	126 363	0	–

^aNumber of beds remained the same in all 3 years.

^bPopulations were calculated based on 2.1% annual growth rate of estimated resident population in 1996.

medical care would choose hospitals such as these, which are known for good diagnosis and intervention. One of the limitations of our study is that the geographic location of residence and occupation at the time of admission were not always recorded in the files of many patients. Thus, some of the CE patients at hospitals in Giza could have been residents of other regions. Secondly, there is a large market for camels

Table 3 Age and sex distribution of cases with human cystic hydatidosis

Age group (years)	Male	Female	Total No.	%
≤ 10	6	3	9	6.8
11–20	19	17	36	27.1
21–30	15	16	31	23.3
31–40	16	14	30	22.6
> 40	13	14	27	20.3
Total	69	64	133	100

imported from Sudan (where the disease is prevalent) in Imbaba, Giza, where camels are kept before being slaughtered in an abattoir in the vicinity. Haridy, Ibrahim and Morsy reported that 4.0%–7.5% of camels slaughtered in Egypt had CE lung infection [11], and Ibrahim and Craig recorded a prevalence of 48% in Libyan camels [16]. It is possible that camels play an important role in the epidemiology of echinococcosis and hydatidosis in Giza governorate. Finally, since Giza Chest Hospital showed the highest incidence of CE, using such a figure for the assessment of the overall incidence rate for this region could have resulted in overestimation of the calculated incidence for Giza governorate.

In general, retrospective hospital surveys have been criticized for not providing precise estimates of disease incidence as not all hospitals in a particular region or district are included in the study, and the population is calculated rather than based on actual census. Furthermore, retrospective hospital survey data on human CE cannot give an accurate picture of the prevalence of infection. A certain number of cases are not seen in hospitals because the infection is asymptomatic or does not require surgical intervention, and some data are not

Table 4 Distribution and treatment of hydatid cysts according to location

Location of cyst	Cases		No. treated cases		
	No.	%	Surgery	PAIR	Chemotherapy
Multiple sites ^a	24	18.0	1	2 ^b	21
Single site					
Liver	54	40.6	25	13 ^b	16
Lung	52	39.1	51	–	1
Spleen	2	1.5	1	–	1
Brain	1	0.8	1	–	–
Total	133	100	79	15	39

^aA total of 21 cases had cysts in 2 organs; the liver was involved in all cases along with lung (11), spleen (5), kidney (4) and brain (1). Three cases had > 2 organs involved: the liver, spleen and kidney were affected in one case; the liver, spleen, kidney and the pancreas in the second case; and the liver, spleen and the pectoralis major muscle in the third case.

^bCases received additional chemotherapy.

PAIR = puncture, aspiration, injection, reaspiration.

available in the files. However, despite such limitations, careful examination of hospital records provides a useful indication of infection expressed as annual rate of hospital cases. It can give an indication of the public health importance of a disease and, when done continuously over many years, detects regional changes in incidence of infection [17].

In this study, we used a formula based on number of hospital beds to correct for the underestimation of annual rates for hospitals that were not included in the survey. It was of especial interest that Matrouh governorate, which is adjacent to the Libyan border, had the highest annual incidence. The Libyan Arab Jamahiriya is known to have a high prevalence of human CE [5].

The finding that all age groups, including children and young adults, were well represented in the confirmed CE cases implies that both adults and children are susceptible to infection. Since about one-third

of the cases were ≤ 20 years of age, it suggests that active transmission occurs and that the disease may be on the increase, especially in Giza and the western governorates, demonstrating the potential public health importance of CE and that consideration should be given to the introduction of prevention and control measures in these regions.

In conclusion, this study proved highly useful in determining the annual incidence of hospitalized CE cases. It identified 2 areas, Matrouh and Giza governorates, where the disease could be of public health importance and CE should perhaps be a notifiable disease in these regions.

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