ABSTRACT

Aim: In this study the aim was to detect the seroprevalence of hydatidosis in Qalubia Governorate

Materials and methods: The studied group consisted of 207 from apparently healthy volunteers (195 males, 12 females, mean age 20.92 ± 1.82 years, min 17, max 55 years) living in Qalubia Governorate. Informed written consent was obtained from each one of them and they were requested to fill a questionnaire form (sociocultural and economic condition, area of living, and demographic data). Blood sampling was performed by intravenous puncture and sera were obtained after centrifugation. Anti-\textit{E. granulosus} IgG antibodies were detected using enzyme linked immunosorbent assay (ELISA).

Results: Of the 207 patients, 13 (6.3%) were seropositive for anti-\textit{E. granulosus} IgG antibodies, out of them 12 (92.3%) were males, and 1 (7.7%) was female, 3 (23.1%) from urban and 10 (76.7%) from rural areas, 8 (61.5%) with pure water supply and 5 (38.5%) without, 12 (92.3%) were in contact with animals, 7 (53.8%) were farmers and 2 (15.4%) were living under bad general conditions.

Conclusion: The seroprevalence of hydatidosis was increased with age, more in males than females, and more in rural areas than urban and contact with animals and farmers than other occupations. All diagnosed cases were asymptomatic.

INTRODUCTION

Hydatidosis is a zoonotic disease that occurs throughout the world and causes considerable economic losses and public health problems in many countries (Haridy et al., 2005). Hydatidosis is an important parasitic disease for herbivores and man caused by the larval stage of \textit{Echinococcus} species (Liu et al., 2005). Adult tapeworms of \textit{E. granulosus} reside in the intestines of definitive host canids, predominantly the domestic dog, but in certain regions wild canids of several genera may be involved in the wildlife cycle (Bai et al., 2002 & Scala and Mazzette, 2009). Definitive hosts are infected after ingesting organs or tissues of infected intermediate hosts. Herbivores and man acquire the larval stage through ingestion of infective eggs shed via the faeces of infected dogs (Wang et al., 2006 & Elshazly et al., 2009). Hu-
man infection may occur by direct contact with dogs or from contaminated environment. When ruminants are slaughtered their disposed viscera may be eaten by definitive hosts. The adult worm is then developed in their intestines (Haridy et al., 2005). About 2–3 million patients are estimated in the world. Hydatid disease in human is potentially dangerous, organ type and cyst sizes are very important in the final pathogenicity of parasite (Arda et al., 2009). Clinical features may be asymptomatic to fatal. Fever is usually absent unless cysts are secondarily infected, wheezing, urticaria, abdominal pain and arthritis (Wang et al., 2008). Distribution of the disease is related to its intermediate and definitive hosts. High prevalence of echinococcosis was recorded in the East and North Africa, Mediterranean countries, Middle East, The People’s Republic of China, South America, Australia, India, north and east Africa, Australia, and South America (Moro et al., 2009). In Egypt, hydatidosis is a real sheep-dog-man problem is a public health problem Hydatidosis is well documented in many Egyptian Governorates among man and stray dogs (Sadjjadi et al., 2009). So the aim of this study was to find the prevalence of hydatidosis in Qalubia Governorate and to analyze the association of place of living, type of activities, and socioeconomic status with it.

Patients and Methods

This study was conducted on 207 randomly selected apparently healthy volunteers living in Qalubia and attending Benha University Hospital as blood donors. They were 195 males and 12 females with mean age 27.1 in males and 27.6 in females. Informed written consent was obtained from each person and they were requested to fill a questionnaire form to gather demographic data, such as gender, age, area of living (city-town-village), socioeconomic status (low-intermediate-high), abdominal pain, chest pain, arthritis and contact with animals. After the questionnaire, 5 ml venous blood was obtained from each person for serological analysis. Blood samples were centrifuged at 3500 g and were stored at -20°C until the day serologic analysis was performed. Anti-E. granulosus antibodies IgG (Anti-EG) were detected by enzyme immunoassay test (EIA) according to Magambo et al. (1996). Detection of Echinococcus IgG antibodies was done by using commercial kit DRG.

Principle of the test:

The DRG Echinococcus IgG ELISA Kit is a solid phase enzyme-linked immunosorbent assay (ELISA). Microtiter wells as a solid phase were coated with Echinococcus antigen. Diluted patient specimens and ready-for-use controls were pipetted into these wells. During incubation Echinococcus-specific antibodies of positive specimens and controls were bound to the immobilized antigens. After a washing step to remove unbound sample and control material, horseradish peroxidase conjugated antihuman IgG antibodies were dispensed into the wells. During a second incubation this anti-IgG conjugate binds specifically to IgG antibodies resulting in the formation of enzyme-linked immune complexes. After a second washing step to remove unbound conjugate the immune complexes formed (in case of positive results) were detected by incubation with TMB substrate and development of a blue color. The blue color turns into yellow by stopping the enzymatic indica-
tor reaction with sulfuric acid. The intensity of this color is directly proportional to the amount of *Echinococcus*-specific IgG antibody in the patient specimen. Absorbance at 450 nm was read using an ELISA microtiter plate reader. Specimen Dilution Prior to assaying dilute each patient specimen 1+100 with Sample Diluent; mix well, let stand for 15 minutes mix well before use. The negative cut-off optical density (OD) value was calculated as the mean +3 SD of the OD values of negative sera from the study group.

**Data analysis:** The collected data were analyzed and tabulated using (SPSS) version 17 software. Frequencies, percentages, mean ±SD & range were computed. Variables were considered using Chi–Square test and t (student) & Spearman's correlation coefficient (r) were used and test of significance, P<0.05, was considered significant.

**RESULTS**

Results are tabulated in tables (1,2 and fig.1).

<table>
<thead>
<tr>
<th>IGg</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>negative</td>
<td>194</td>
<td>93.7</td>
</tr>
<tr>
<td>positive</td>
<td>13</td>
<td>6.3</td>
</tr>
<tr>
<td>Total</td>
<td>207</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Figure (1): Scatter diagram showing weak non-significant positive correlation between age and IgG titre.

---

Egypt. J. Med. Sci. 32 (1) 2011
Table (2): Showing positive and negative cases regarding to different variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>IGg negative N=194</th>
<th>IGg positive N=13</th>
<th>Total N=207</th>
<th>&quot;X²&quot;</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>183</td>
<td>94.3%</td>
<td>12</td>
<td>92.3%</td>
<td>195</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>5.7%</td>
<td>1</td>
<td>7.7%</td>
<td>12</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmer</td>
<td>91</td>
<td>46.9%</td>
<td>7</td>
<td>53.8%</td>
<td>98</td>
</tr>
<tr>
<td>Mental work</td>
<td>26</td>
<td>13.4%</td>
<td>0</td>
<td>0%</td>
<td>26</td>
</tr>
<tr>
<td>Others</td>
<td>77</td>
<td>39.7%</td>
<td>6</td>
<td>46.2%</td>
<td>83</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>54</td>
<td>27.8%</td>
<td>3</td>
<td>23.1%</td>
<td>57</td>
</tr>
<tr>
<td>Rural</td>
<td>140</td>
<td>72.2%</td>
<td>10</td>
<td>76.9%</td>
<td>150</td>
</tr>
<tr>
<td>Pure water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>84</td>
<td>43.3%</td>
<td>8</td>
<td>61.5%</td>
<td>92</td>
</tr>
<tr>
<td>No</td>
<td>182</td>
<td>93.8%</td>
<td>1</td>
<td>92.3%</td>
<td>183</td>
</tr>
<tr>
<td>Hygiene</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>172</td>
<td>88.7%</td>
<td>11</td>
<td>84.6%</td>
<td>183</td>
</tr>
<tr>
<td>No</td>
<td>22</td>
<td>11.3%</td>
<td>2</td>
<td>15.4%</td>
<td>24</td>
</tr>
<tr>
<td>Respiratory symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>26</td>
<td>13.4%</td>
<td>0</td>
<td>0%</td>
<td>26</td>
</tr>
<tr>
<td>No</td>
<td>168</td>
<td>86.6%</td>
<td>13</td>
<td>100.0%</td>
<td>181</td>
</tr>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(17-55)</td>
<td>27.1</td>
<td>7.1</td>
<td>27.6</td>
<td>5.3</td>
<td>-0.28</td>
</tr>
</tbody>
</table>
DISCUSSION

Human hydatidosis still represents a public health problem that will continue in the future as, because of latency, incidence rates will stay long relevant (Gabriele et al., 2004). A total of 207 persons were screened by ELISA for detection of prevalence of hydatidosis (E. granulosus infection) in Qalubia Governorate.

The results of this study showed that, total seropositivity for specific IgG Echinococcus antibodies was 13 (6.3%). This result agrees with that of Zarif-fard et al. (1999) in Iran, who reported total seroprevalence (5.55%). Lower results were recorded by Magambo et al. (1996) who reported (0.5%) out of 3443 people were screened by ultrasound to determine the prevalence of hydatid disease in southern Sudan by Indirect Hemagglutination serologic test and the Bouya people who showed an overall hydatid prevalence of 2%. Also Shambesh et al. (1992) reported overall 2% prevalence of hydatidosis in Libya. More recent publications regarding different regions by Gabriel et al. (2004), reported an annual mean incidence rate of surgical cases of 9.77/100,000 inhabitants in Sardinia, 1.57 in Romagna, 2.30 in Sicily and of 2.33 in Apulia, the latter encompassing only hepatic cysts treated in the region, irrespective of residence of subjects in an ultrasound survey. In China, Wang et al. (2008) reported prevalence of 1%. Retrospective survey of human hydatidosis by Kebede et al. (2010) in Bahir Dar, north-western Ethiopia, that out of the total of 36,402 patients admitted for ultrasound examination, 24 hydatidosis cases were registered, giving a mean annual incidence rate of approximately 2.3 cases per 100,000 per year. Higher results were recorded in Israel (9%) by Nahmias et al. (2002). Bai et al. (2002) reported a seropositivity rate of 8.6% in a population, 20-29 years old age group in China, and (13.2%) in Turkey were seropositive for anti-E. granulosus IgG by (Arda et al., 2009).

The difference between the results in this study and other studies may be due to increased diversity of alternative suitable intermediate hosts coupled with large populations of dogs in villages which can be one of the major causes of intensive and stable transmission around human settlements as reported by Avgirinos et al. (2006). Also Sadjjadi et al. (2007) found that contamination formed by infectious eggs in the excretions of infected dogs, was considered as the infection risk for human and livestock. Human activities affecting the transmission pattern of echinococcosis are reported worldwide, consequently increasing the opportunity for transmission of echinococcosis (Kebede et al., 2009). In addition the diagnostic sensitivity and specificity of tests vary according to the nature, quantity of the antigen and the methodological sensitivity of the selected technology as ELISA is highly sensitive & specific for the detection of circulatory hydatid antigen in human (Fakhar et al., 2007). However, laboratories in some developing countries lack the technical expertise, advanced equipments and reagents to perform sophisticated tests, which are time consuming (khan et al., 2010).

Regarding relation between seropositivity and sex, out of 13 positive cases 12 (92.3%) were males and 1 (7.7%) was female, so it is clear from the
results reported that the prevalence of hydatid disease is affected by sex, positive males were insignificantly higher than females (P> 5.05). This result agrees with Wang et al. (2006), who reported higher positivity in males and this may be due to that, men work more in the farms and are more exposed to the animals than women; also activities of males are more than females affecting the transmission pattern of echinococcosis and consequently increasing the opportunity for transmission of echinococcosis. In contrary, Shambesh et al. (1992), Liu et al. (2005) and, Arda et al. (2009) who reported that the infection rate in females is considerably higher than that of males, they said that women are responsible for the home activities including feeding dogs, collecting yak dung for fuel, and milking livestock in these areas and they are more frequently exposed to the definitive hosts of *Echinococcus* worm. Also in a study by Magambo et al. (1996) in south-western Sudan, they found that the proportion of hydatid infected women was almost twice than that of men (M:F ratio of 1:1.7), with most of those infected being women in the child-bearing age bracket with significant different between males and females.

Concerning occupation, out of 13 seropositive cases, 7 (53.8%) were farmers and 6 (46.2%) with other jobs with no statistically significant difference. So this study agrees with Jenkins and Morris (2003), who reported that human activities as agricultural work affecting the transmission pattern of echinococcosis. Also Moro et al. (2009) reported that reservoir hosts such as dogs were reported as main sources of human echinococcosis in Japan and Australia. Human activities affecting the transmission of echinococcosis in China are usually related to pastoralism and agriculture, which modify the landscape creating better habitats for intermediate host species (e.g., rodents and picas), consequently increasing the opportunity for transmission of echinococcosis (Craig et al., 2000 & Giraudoux et al., 2002).

Regarding residence, high seropositivity rates in patients living in rural areas or in patients with low economic status were higher, 10 (76.9%) than people living urban areas, 3 (23.1%) with no statistically significant difference between seropositive and seronegative groups. High seropositivity rates in patients living in rural areas or in patients with low economic status may be attributed to the lack of adequate control systems in domestic animals and the high number of stray animals as reported by Sadjjadi et al. (2007). Also Bank et al. (2006) & Nahmias et al. (2002) showed that village prevalence rates of hydatidosis correlated to fencing practices, and they suggested a direct link between hydatidosis and land use on the Tibetan plateau.

The result of the present work demonstrated that out of 13 seropositive cases, 2 (15.4%) were living in bad hygienic conditions and 5 (61.5%) without pure water supply.

This result agrees with Mirzanejad et al. (2010) who indicated that living in low socioeconomic conditions, bad hygienic conditions and nature of the district causes contamination of the environment and consequently ingestion of eggs from contaminated vegetables or drinking water leading to elevation of positivity.
rate. Place of living or economic status may be speculated to be due to the lack of adequate control systems in domestic animals and the high number of stray animals in cities respectively (McManus, 2010).

In this study, out of 13 seropositive cases, 12(92.3%) were in contact with sheep and dogs. This is in accordance with Mantovani and Lasagna (1995) and Okua et al. (2004), who reported that 36.4% of the CE patients were less than 14 years old due to direct contact and playing with dogs. Also Shambesh et al. (1992) reported that 12(92.3%) of hydatid seropositive cases were in contact with sheep and dogs in Libya and Libyan people keep guard dogs. They also reported that many people own a single dog, invariably kept outside and often chained up. Stray dogs are common, roaming the countryside to scavenge sheep carcasses and such dogs could be the main reservoir of *E. granulosus* in Libya. Because of the minimal direct human dog contact, transmission of hydatid disease in Libya is probably indirect by ingestion of eggs, place of living or economic status may be speculated to be due to the lack of adequate control systems in domestic animals and the high number of stray animals in cities respectively (Lotfi et al., 2010). Similar results were obtained in rural population of Eastern Azerbaijan and Kermanshah specially in summer and autumn (Arda et al., 2009). They reported that direct contact with dogs, handling farm animals and face less public health could be important reasons for high prevalence of hydatidosis in these areas.

Regarding clinical manifestations, all seropositive cases were normal without any clinical manifestations, suggesting that the disease in early stage and still complications were not developed. This agrees with Torgerson & Deplazes, (2009), who reported that echinococcosis usually manifests 2–15 years post-infection with nonspecific symptoms. Consequently, humans may be infected as children, but only diagnosed when they have become adults.

Concerning age, there was weak non-significant positive correlation between age and IgG antibody titre. This result agrees with Shambesh et al. (1992) & Arda et al. (2009) who reported that the prevalence of hydatid cysts increased with age. Also Bai et al. (2002) reported a seropositivity rate of 8.6% in a population in 20-29 years old age group and the seropositivity rate was reported to be higher in the patients aged more than 50 years. In addition, Liu et al. (2005) & Wang et al. (2008) from Sichuan and Qinghai revealed that adults had much higher infection rates than children and the infection rate increased with age. They also reported that increased activities in the environment, working in and handling farm animals increase chances of infection.

This study concluded that hydatidosis is an important public health problem in Egypt, confirms and extends previous report showing that prevalence of hydatid disease is influenced by sex and locality, contact with animals occupation and residence. It is recommended that:

1. New medical checks and controls are hoped for at a political level which will increase the financial support for the farmers.

2. Encourage importing and testing of...
vaccines which have already been tested in other areas in the world.

3. Treatment of animals with antiparasite medicines (specially sheep and dogs) and prophylactic antihelmenthic dosage four times yearly for all animal farms.

4. Preventing illegal slaughtering and making healthy slaughter houses (not allowing rambling dogs enter to the field of slaughterhouses).

5. Public health learning through TV, and teaching livestock holders and people who are at risk about periodic epidemiologic investigations.

REFERENCES


الهدف: في هذه الدراسة كان الهدف هو الكشف عن الانتشار المصلي لداء الكيسات المائية (الهيداتيدوزس) في محافظة القليوبية.

المواد والاساليب: تم إجراء هذه الدراسة على عدد 202 شخص من متطوعين أصحاء من سكان محافظة القليوبية (195 من الذكور، و 17 من الإناث، وكان متوسط أعمارهم بين 20،242 ± 82 سنة، 17 سنة حد أدنى و 55 سنة ححد أقصى). قبل إجراء البحث تم الحصول على موافقة كتابية من كل واحد منهم وطلب منهم ملء استمارة الاستبيان (حالة الاجتماعية والثقافية والاقتصادية، ومنطقة للمعيشة، والبيانات الدموجراافية). وتم الحصول على عينات الدم. و بعد ذلك تم فصل الأمـصال بـطريقة الطرد المركزي وتم حفظ الأمـصال عند درجة حرارة 2 درجة مئوية لحين إجراء الاختبار للكشف عن الأجسام المضادة باستخدام إنزم مرتبط بالفحص المناخي (إليزا).

النتائج: من بين 207 مريضًا تبين أن معدل الانتشار المصلي للأيضاد المناعية ج هو 13 (6.3 %) منها 12 (92.3 %) من الذكور، و 1 (7.7 %) من الإناث وكان توزيعهم 3 (12.1 %) من المناطق الحضرية و 17.2 (76.7 %) من المناطق الريفية، و 8 (61.5 %) مع توافر المياه النقية و 5 (28.5 %) من دون، 12 (92.3 %) والأتـصال مع الحيوانات، وكانت 7 (36.8 %) من المزارعين و 2 (15.4 %) كانوا يعيشون في ظروف سيئة عموما.

Prevalence Of Hydatidosis In Qalubia Governorate

Egypt. J. Med. Sci. 32 (1) 2011
الخلاصة: تبين زيادة الانتشار للمرض مع التقدم في السن، وأكثر في الذكور عن الإناث، وأكثر في المناطق الريفية عنها في المناطق الحضرية والاتصال مع الحيوانات وفي المزارعين كانت النسبة أكبر من أي مهنة أخرى، وكانت جميع الحالات التي تم تشخيصها بدون أعراض ظاهرة.