



The Contribution of Hydatid Serology in the Diagnosis and Monitoring of Hydatid Cyst in the Parasitology and Mycology Department at the Avicenna Military Hospital of Marrakesh, Morocco

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ABSTRACT

Introduction: Hydatid disease is also known as cystic echinococcosis (CE) is a zoonotic disease caused by a parasitic infection. CE is caused by the larval stage of *Echinococcus granulosus*. Humans are accidental intermediate hosts and they get infected following the accidental ingestion of *Echinococcus granulosus* eggs. Usually, the disease is diagnosed regarding clinical history, serology and imaging.

Aims: To evaluate the contribution of Hydatid serology in the diagnosis and monitoring of Hydatid cysts in the parasitology and mycology department at the AMH of Marrakesh, Morocco.

Material and Methods: This study was conducted to evaluate the contribution of Hydatid serology in the diagnosis and monitoring of Hydatid cysts in the parasitology and mycology department at the Avicenna Military Hospital (AMH) of Marrakesh, Morocco. A retrospective study among 62 suspected cases from January 2018-December 2020 was conducted.

Results: The ELISA test was used for serology. Out of the 62 cases, 23 (37%) were seropositive. Most of the seropositive cases had an average age of 38 years and were from rural areas, 86.5%. The liver was the most affected organ, 56.5%, and hypochondriac pain was the most prevalent symptom, 62.7%. Otherwise, the false-negative cases for the ELISA test were high implying the test had low sensitivity and specificity. Otherwise, the ELISA test can be used for the diagnosis and monitoring of Hydatid disease.

Conclusion: Hydatid cyst is relatively common in Morocco with significant morbidity and mortality and timely detection is imperative towards management and preventive efforts.

Keywords: Hydatid cyst, Hydatid disease, *Echinococcus granulosus*, cystic echinococcosis, ELISA test, prevention

INTRODUCTION

Hydatid disease is also known as cystic echinococcosis (CE) is a zoonotic disease caused by a parasitic infection. CE has been classified by WHO as among the emerging neglected diseases across the globe.¹ CE is caused by the larval stage of *Echinococcus granulosus*.² Usually, the dogs and canids host the adult tapeworms which are ingested by the herbivores (intermediate hosts).³ Humans are accidental intermediate hosts and they get infected following the accidental ingestion of *Echinococcus granulosus* eggs.⁴ The disease develops slowly in humans as a growing cystic lesion in the affected

organ resulting in other disease manifestations. The disease is more prevalent in Eastern Europe, Mediterranean countries, South America among others.⁵

The definitive diagnosis of CE is arrived at by diagnostic imaging.⁶ However, histology and serological testing are significant. Serological testing has been found effective in diagnosing CE at early stages and for monitoring the disease progress.¹ There exist diverse serological tests such as indirect hemagglutination, enzyme-linked immunosorbent assay (ELISA), latex agglutination test among others.⁷ These tests are infrequently used due to their low sensitivity

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and low specificity with up to 30% false-negative and up to 25 % false positive respectively.² This was vindicated in a serological study of Hydatid disease where out of the suspected 40 cases for Hydatid disease of the pancreas, only 15 cases showed seropositive for CE.⁸

Usually, a positive serologic test for CE is significant for showing the disease burden and epidemiology of the disease in a given region.⁶ The study was aimed at evaluating the contribution of Hydatid serology in the diagnosis and monitoring of Hydatid cysts in the parasitology and mycology department at the AMH of Marrakesh, Morocco.

MATERIAL AND METHODS

The study was based on a retrospective study of 62 suspected cases of Hydatid cyst who were investigated for three years, January 2018-December 2020. All the documented Hydatid cyst cases collected in the parasitology mycology department at the Avicenna Military Hospital (AMH) of Marrakech, Morocco were investigated. The serology was carried out by ELISA technique on an Evolis Twin Plus® ELISA test checked for the presence of Ig A antibodies for *Echinococcus granulosus*. Clinical data for all the cases were documented and other laboratory investigations such as blood count were conducted. The seropositive cases were compared with seronegative results. The sensitivity and specificity of the ELISA test were based on histopathology results. For confirmatory tests, a Chest X-ray and abdominal ultrasound were conducted.

RESULTS

The study evaluated 62 suspected cases of Hydatid cyst. The prevalence of positive Hydatid serology was 37% (i.e., 23 positive serology with a predominance of women: sex ratio of 0.43). Patients with a Hydatid cyst with positive serology were represented by the age group between 31 and 40 years, with an average age of 38 years. The prevalence of positive serology was more prevalent in rural areas, 86.5%. The notion of contact with dogs is often found. It is positive in 52 patients in this series, i.e., 83.8% of case.

The liver was the most affected organ (56.5%), followed by the lungs 21.7%, the brain 4.3 for the rest of the patients, the locations were not communicated Simultaneous localization in our series or no diagnosis was made in this step. General disease condition was domiciled in most cases except 4 cases (6.4%) where deterioration of general condition was noted. Fever was observed in 30 (48.4%) patients while weight loss, nausea, and vomiting were observed in 12 (19%) of the cases. Pain in the right hypochondrium was the main symptom of the disease, especially in patients with hepatic localization,

with varying intensity. It was found in 62.7% of cases. Hepatomegaly was found in 16.6% of cases, most often associated with pain. Cough was the most frequent reason for consultation in patients with pulmonary localization. It was found in 24.6% of cases, associated or not with dyspnea, and with hemoptysis in 1.5% of cases. Chest pain was observed in 14.2% of cases. These pains can be localised or diffuse, exaggerating with coughing or with breathing.

In this series, in 4.8% of cases, the diagnosis was made by chance, either during medical campaigns or following a workup for another concomitant disease. A blood count was performed in patients, it revealed: Hyperleukocytosis in 14.4% of patients. Hypereosinophilia of 40.4% of cases and anaemia 7.1% of cases. A chest x-ray was performed routinely in all patients, and an ultrasound was used to determine the type, size, and location of certain cysts. In this series, all the patients benefited from this examination. All patients in this series underwent surgical treatment, with full recovery and healing in the majority of patients. Three cases of recurrence correspond to three patients operated again for Hydatid cyst. Only one case of death has been reported. This is a 65-year-old man with hepatic location (14cm) associated with a huge Hydatid splenic cyst (7cm).

DISCUSSION

Among the 62 patients, 23 cases representing 37% were correctly identified as true positives. The rest turned out negative representing a false negative rate of 63% which indicates low sensitivity and specificity. Previous studies equally reveal significant variations in rates of false negatives with one study reporting a 37% incidence of false negatives.⁸ Another study using ELISA found a 15% rate of false-negative.⁹ Although this work could not work out false positives since reviewed files only consisted of positive cases, previous studies such as Sirucasano et al.¹⁰ reported a relatively high rate of false-positives of 25% which lowers the sensitivity of the test.

The variations in the rates of false negatives and false positives are partly explained by differences in manufacture and underlying principle i.e. whether the test is based on the enzyme-linked immunosorbent assay, indirect hemagglutination or latex agglutination⁴. Nonetheless, the relatively low sensitivity and specificity of serological tests remain a significant impediment in the diagnosis of hydatid cysts.

Moreover, the variations in sensitivity and specificity in different studies are potentially explained by several factors. Factors that lead to differences include differences in cut off values for detection in different tests, differences in techniques,¹¹ an individual's immune response which correlates to differences in immunoglobulin titers in serum¹²

and differences in the location of cysts.² The occurrence of different strains in different parts of the world further contributes to observed variations.² The dismal performance of serological tests has limited their usefulness as definitive diagnostic tools thereby predominantly used in low-income settings, for screening and disease progression monitoring. Even so, there is a potential for improvement especially with the use of synthetic antigens that reduce rates of cross-sensitivity² and standardising titre cut-off for diagnosis and antigen preparation.¹

The study findings indicated the liver was the most affected organ (56.5%), followed by the lungs 21.7 and the brain at 4.3%. The study findings also indicated that 48.4% of the patients had weight loss and pain localised at the right hypochondrium was the most common symptom of the disease with 62.7%. Laboratory findings indicated 40.4% of the patients were experiencing hyper eosinophilia. These findings present baseline characteristics that could be used in screening individuals for hydatid cysts. Interestingly, some symptoms had higher cyst detection power compared to serological tests. Hence, in negative serological test results, ultrasound or computed tomography scans for patients with these symptoms should be conducted to rule out hydatid cyst.¹ Ultrasound and CT scans are relatively superior with remarkably high sensitivity and specificity. Moreover, these imaging diagnostic approaches enable the determination of hydatid cyst size and inform the management modality.¹³

CONCLUSION

In conclusion, hydatid cyst is relatively common in Morocco with significant morbidity and mortality and timely detection is imperative towards management and preventive efforts. Even so, serological testing for hydatid cyst is significantly affected by the low sensitivity and specificity of the test which limits its application as the primary definitive test. Hence, the test can only be reserved for screening and disease monitoring. From our study findings, however, we recommend further diagnostic evaluation based on ultrasound or CT scan for individuals who turn negative on serology despite having symptoms.

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Authors' Contribution:

MOUTAJ R., LMIMOUNI B. and EL MEZOUARI E. designed and directed the project. ET-TAHOURI Z., OUSSAGA J. collected the data; SBAI M. analysed the data; EL MEZOUARI E. interpreted the results. All authors contributed to manuscript writing and reviewing.

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