

The impact of changing environmental conditions on incidences of Alveolar hydatid disease in Taiz city, Yemen: A Case Series

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ABSTRACT

This case series was conducted to study the occurrence of alveolar hydatid cyst cases in Al Hawban district, Taiz governorate in Yemen from 2006 to 2014. The aim of this study was to explore the demographic determinants of the affected cases and assess the effect of the changed social environment as a result of the armed conflict and internal displacement. A number of 25 alveolar hydatid disease cases were identified. The majority of cases being in males. The mean age of the cases was 22 years and the peak presentation of the cases was in the years 2011 and 2012 where the conflict was intensified. The majority of the cases were from Al Hawban district followed by neighboring districts such as Mawiah, Dimnah, Al Nagdin and Al Quaidah. Findings from this study highlight the impact of the changing environment on the occurrence of Alveolar Hydatid disease.

Keywords: Hydatid disease, Echinococcosis, Factors, Yemen, Conflict.

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INTRODUCTION

Hydatid disease or (Human echinococcosis) is a zoonosis caused by parasites named "echinococcosis". The life cycle of this disease is characterized by having dogs and other carnivores as definitive hosts (DH), with their small intestine serving as the primary habitat, with sheep and humans as intermediate hosts (IH). Its infective stage (IS) begins when the intermediate host ingests grass containing eggs. Humans are considered to be accidental hosts (blind ended). Ingesting or inhaling eggs results in the formation of hydatid cysts in the internal organs, but the parasite is not transmitted to others. This is considered to be the diagnostic stage of the disease.¹ Hydatid disease can be either cystic or alveolar. Both types present a substantial health burden. It is estimated that worldwide almost 1 million cases can be presented at any one time.¹ In endemic areas, the incidence of cystic echinococcosis in humans can exceed 50 cases per 100,000 person-years, with prevalence rates reaching as high as 5% to 10% in certain regions of Argentina, Peru, East Africa, Central Asia, and China.¹

The occurrence of hydatid disease is influenced by many determinants. Geographical location is considered a major one. Cystic HD was found in countries involved in raising livestock. Pulmonary HD is mainly distributed in northern hemisphere countries such as China, Russia, continental Europe and North America.¹

The physical determinants such as genetic susceptibility and age are also considered important factors influencing the occurrence and type of HD. For instance, pulmonary hydatidosis is reported more commonly in children.² Low socioeconomic status and poor hygiene practices are also two major factors that have been shown to increase the risk of disease transmission.¹ The environment is another factor influencing the number of hydatid disease incidences, as high altitude, high relative humidity, and a high ratio of grassland can increase the survival of the parasite.³ For the above reasons, health programs are generally focused on three key areas; sanitation, health access, and increasing awareness around disease transmission.¹

While there are efforts to prevent the occurrence of HD, the alveolar type is a little bit more challenging to address as its life cycle involves different animal species (as both intermediate and definitive hosts).¹ The alveolar type is the second most common type of hydatid disease, and is commonly seen in children, and lower lobes of the lung. Cyst sizes vary from 1 to 20 cm, Giant cysts are also observed in children due to their lung elasticity.^{4, 5}

Hydatid disease is endemic in Yemen, and is more prevalent in females than males. with the hepatic type representing the majority of cases.^{6, 7} Yemen-mainly Taiz- went through an outgoing armed conflict from 2011 to 2018 with continuous IDP influx to Al Hawban district.^{8, 9} Here, this study was conducted to highlight the effect of the changing environment on the occurrence of alveolar HD, taking into consideration the limitations regarding the knowledge of the disease as little is known about its prevalence because alveolar HD was initially discovered as isolated cases and treated at later stages.

Methods

Data was obtained from patients admitted to various hospitals throughout Al Hawban district, in Taiz governorate, Yemen, from 2006 to 2014. Clinical examination and radiological investigation were both done to diagnose the alveolar type of HD cases. Then surgical detection and removal of the cysts were done followed by microscopic examination of the aspirated hydatid fluid for confirmation. Prior to the study, informed consent was obtained from all participants. Descriptive statistics were used to summarize the results. Data frequency for the variables (age, sex, year of presentation, geographic location and occupation) were taken and analyzed. The mean was also calculated.

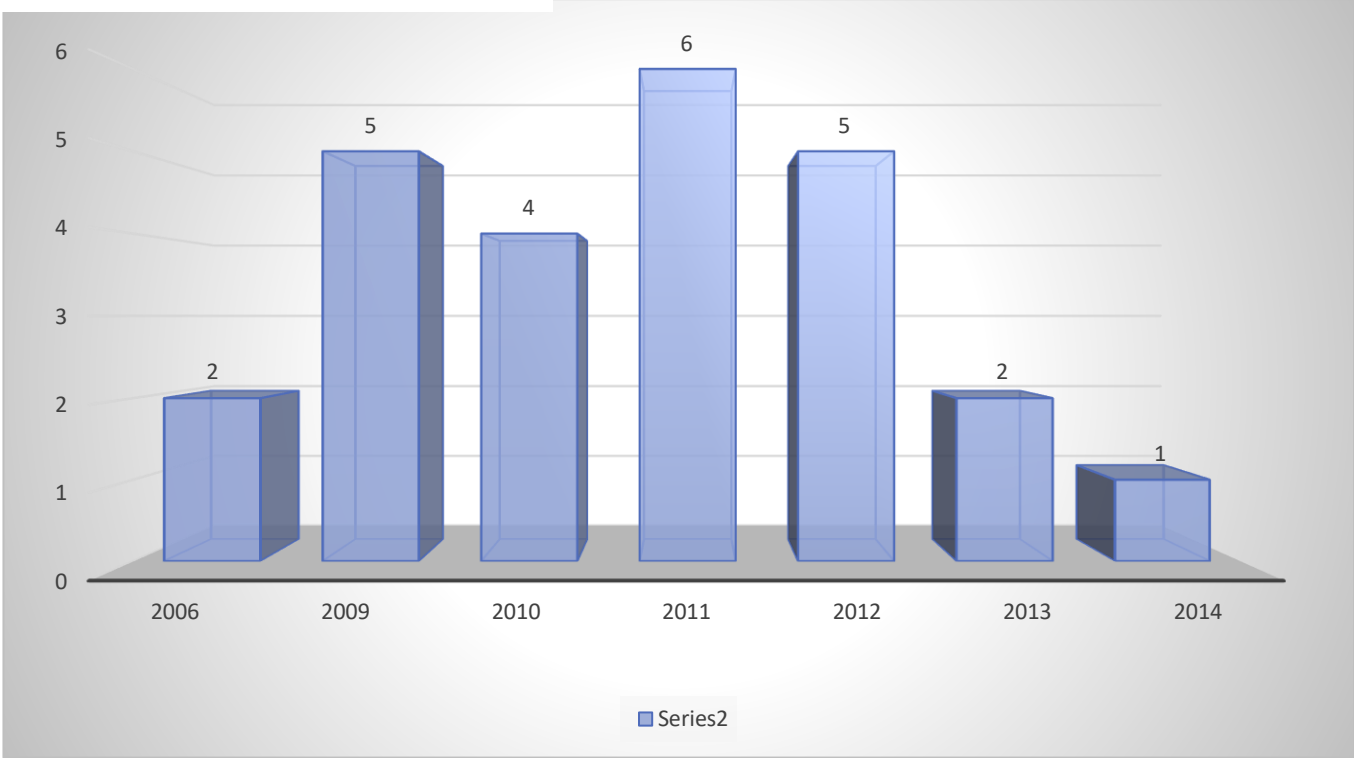
Results

25 alveolar hydatid cases were identified during this investigation. More cases were reported in males than females (13 males and 11 females). With peak of presentation in the years 2011 and 2012 see figure 1.



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Figure 1: Number of cases per year



The mean age of the cases was 22 years old. Participants were primarily from Al Hawban district, and surrounding areas. These include Mawiah

,Dimnah , Al Nagdin and Al Quidah as shown in Table 1.

Table 1: Number of cases by district

Occupation	Number of cases
Al Harrair	1
Al Hawban	7
Al Nagdain	3
Al Qaidah	3
Dimnah	3
Saber Moadem	2
Shraab	1
Taiziah	2
Mawiah	3

The disease was mainly distributed among students followed by students who dropped out of school then

housewives (6,6, and 5 respectively). See table 2.

**Table 2: Number of cases by occupation**

occupation	Number of cases
Builder	1
Child	1
Farmer	3
Housewife	5
Out of school	6
Shop keeper	1
Student	6
Not working	1
Cleaner	1

DISCUSSION

According to the Social – Ecological model.¹⁰ The unfavorable neighborhood environments have been found to influence cultural and behavioral changes in the community, in which contribute to the presence of diseases. The environment - as it is considered the outermost determinant - affects the rest of the factors that contribute to the outcome of any health problem.¹⁰ Yemen, particularly Taiz, experienced continuous environmental changes due to armed conflict and frequent IDP movements throughout the study period.^{8, 9} The conflict had a significant negative impact on the quality of life of the region's community, as well as the local environment.

For instant, neighborhoods become dirty, locals began neglecting personal hygiene and other public health measures such as wearing masks. Consequently, the parasite's eggs become lodged in the mucous membranes and vessels, thus entering the lungs without bypassing the liver. Additionally, as a consequence of the environmental changes, health systems were destroyed. So limitation of access and timely diagnoses can exacerbate the occurrence of alveolar hydatid disease. Although HD and its determinants (age , sex, year of presentation, geographic location and occupation) were studied before by different researchers, our study showed some differences in the outcomes as result of the changing factors. For instant, many studies have shown that HD occurs more among females than males^{6, 7}, while our study showed the opposite (13

male,11 female). This may be attributed to the fact that males have recreational activities more likely to be based outdoors, and also because they are more likely to be employed in high-risk occupations. Similar picture was reported by study conducted in Kyrgyzstan.¹¹ Adding to the above, HD is considered to be an occupational disease. This means that it occurs mainly among groups with specific occupations and their families, such as farmers, zookeepers and shoemakers. In this study we found it distributed mainly among adolescents who are students, students , school dropouts and housewives (6,6,5) respectively. This may also be attributed to the mean age of study groups as it known that the human infection - specifically alveolar type - is acquired mainly in childhood through contact with infected animals.² Efforts should be made to maintain a clean and stable environment, and to increase awareness of the importance of public health interventions such as wearing masks . Increasing healthcare infrastructure would also help to respond to the evolving health needs of the population to respond to the evolving health needs of the population.

CONCLUSION

To summarize, this case series was conducted to investigate the occurrence of alveolar hydatid disease cases in Al Habwan district, Taiz governorate, Yemen from 2006 to 2014. The study found that among 25 disease cases identified, the majority occurred in males, contrasting with findings from other literature.



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The mean age of symptom onset was found to be 22 years. Regarding demographics, disease cases occurred mainly among students, followed by school dropouts and finally housewives. The changing environment due to the continuous armed conflict and the frequent internal displacement of the population played a significant role in AHD

incidences. Maintaining a clean environment, increasing awareness about the importance of public health interventions such as mask wearing, and strengthening healthcare infrastructure are crucial in responding to the evolving health needs of the population.

Abbreviations

Sno	Abbreviations and symbols	
1	HD	Hydatid Disease
2	IH	Intermediate Hosts
3	IS	Infective Stage



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