

## **PATHOLOGICAL EXAMINATION OF *Echinococcus granulosus* INFECTION IN LUNGS OF SHEEP IN KERBALA PROVINCE.**

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### **ABSTRACT**

Parasitic infection of *Echinococcus granulosus* infects many animals because of hosts variation ; intermediate host include ,sheep ,cattle ,goats ,pigs ,horses and camels as well as human. Transmitted to intermediate host by the ingestion of egg and transmitted to definitive host via eating infected mature cyst's containing organs. Final host was dog and canine species were the adult worms may survive for up to 3 years and laying egg after 6-10 month in dog that excretes with feces. The eggs may be eaten in food such as vegetables , herbs ,fruit or drunk in contaminated water ,they can also stick to the hands when a person pet an infected dog or cat ,handles a wild animal or carcass, or touches contaminated soil and vegetation . One hundred 100 lungs specimens were examined in field and in laboratory, results showed that more than 50% of lungs samples were infected with hydatid cysts or *Echinococcus granulosus*, histopathological examination showed sever destructive and necrotic with hemolytic changes in lungs tissues contained *Echinococcus granulosus* cysts .Conclusions: parasitic infection *Echinococcus granulosus* or hydatid cysts were predominantly and commonly existence in sheep living in Kerbala.

## **INTRODUCTION**

hydatid disease is caused by *Echinococcus multilocularis*, *Echinococcus granulosus*, *Echinococcus vogeli*, and *Echinococcus oligarthrus*(1;2) *Echinococcus multilocularis* causes alveolar or pulmonary echinococcosis (AE), *Echinococcus granulosus* causes cystic echinococcosis, *Echinococcus vogeli* causes polycystic echinococcosis, and *Echinococcus oligarthrus* is an extremely rare cause of human echinococcosis(2) the definitive hosts, foxes, dogs, cats, coyotes, and wolves(2) Gravid proglottids release eggs that are passed in the feces (2). After ingestion by a suitable intermediate host (small rodents), the egg hatches in the small bowel and releases an oncosphere that penetrates the intestinal wall and migrates through the circulatory system into various organs, particularly the liver and lungs(1;2). The larval growth in the liver indefinitely remains in the proliferative stage, resulting in invasion of the surrounding tissues(2) The definite host is infected by ingesting the cyst-containing organs of the intermediate host(2) After ingestion, the protoscolices evaginate, attach to the intestinal mucosa, and develop into adult stages within 32–80 days.(2) With *Echinococcus vogeli*, the definitive hosts are bush dogs and dogs, the intermediate hosts are rodents, and the larval stage (in the liver, lungs and other organs) develops both externally and internally, resulting in multiple vesicles (2) *Echinococcus oligarthrus*, the life cycle involves wild felids as definitive hosts and rodents as intermediate hosts(2) infection occur by ingesting embryonated eggs in feces of the definitive hosts.(2) Pulmonary alveolar echinococcosis is caused by hematogenous spreading from hepatic lesions (3). The adult *Echinococcus granulosus* resides mainly in the small gut of the dogs (1). The intermediate hosts including humans are infected by ingestion of parasitic eggs excreted in the feces of the dogs(1) Clinical pulmonary manifestations include cough, dyspnea, chest pain, and fever(1) Rupture of hydatid cysts into a bronchus may result in expectoration of cystic fluid containing parasite membrane, hemoptysis, asthma-liked symptoms, respiratory distress, persistent pneumonia, anaphylactic shock, and sepsis (4;5) and elevation of serum IgG and eosinophilia(6). Rupture of the echinococcal cysts into the pleural space may result in pleural effusion, empyema, and pneumothorax (1) Immunodiagnostic tests using purified *Echinococcus granulosus* antigens have preferable sensitivity and specificity for the diagnosis of AE(7) A serologic method

using the synthetic p176 peptide for diagnosis of pulmonary hydatinosis demonstrated overall 78.69% of sensitivity and 96.88 of specificity(8) The most significant factor of seropositivity is the presence of the hydatid cyst complications or rupture due to isolation of the hydatid cyst content from the human immune system by developing a very thick collagen layer, contributing to minimal or nil antigen release and subsequent minimal or nil antibody responses (8) Chest roentgenographs demonstrate solitary or multiple round opacification mimicking lung tumors(9) Magnetic resonance imaging can detect early pulmonary AE (10) Unusual presentation of endobronchial hydatid cyst with a whitish-yellow gelatinous membrane was demonstrated by bronchoscopic examination in a child(11).Treatment for many years with mebendazole, praziquantel, or albendazole is useful, but treatment of hydatid cyst is primary surgical(12) but should avoid segmentectomy, lobectomy, and pneumonectomy(13;14).

## MATERIALS AND METHODS

**Field work: A:** samples: one hundred 100 lung were collected from sheep living in Kerbala Province and were slaughtered in the same province. B- Cleaned containers ; test tubes and gloves.

**Laboratory work:** samples: 1- cystic lesions excluded from infected lungs which attached to small piece's 1cm<sup>3</sup> of nearby tissues and fixed with 10% neutral formalin solution and processing according to(15)(16). 2-Hydatid cyst fluids were taken in special test tubes by centrifugation at 4000 rmp for30 minutes, ,then taken one drop from supernatant to see protoscolices under microscope(17).

## RESULTS AND DISCUSSION

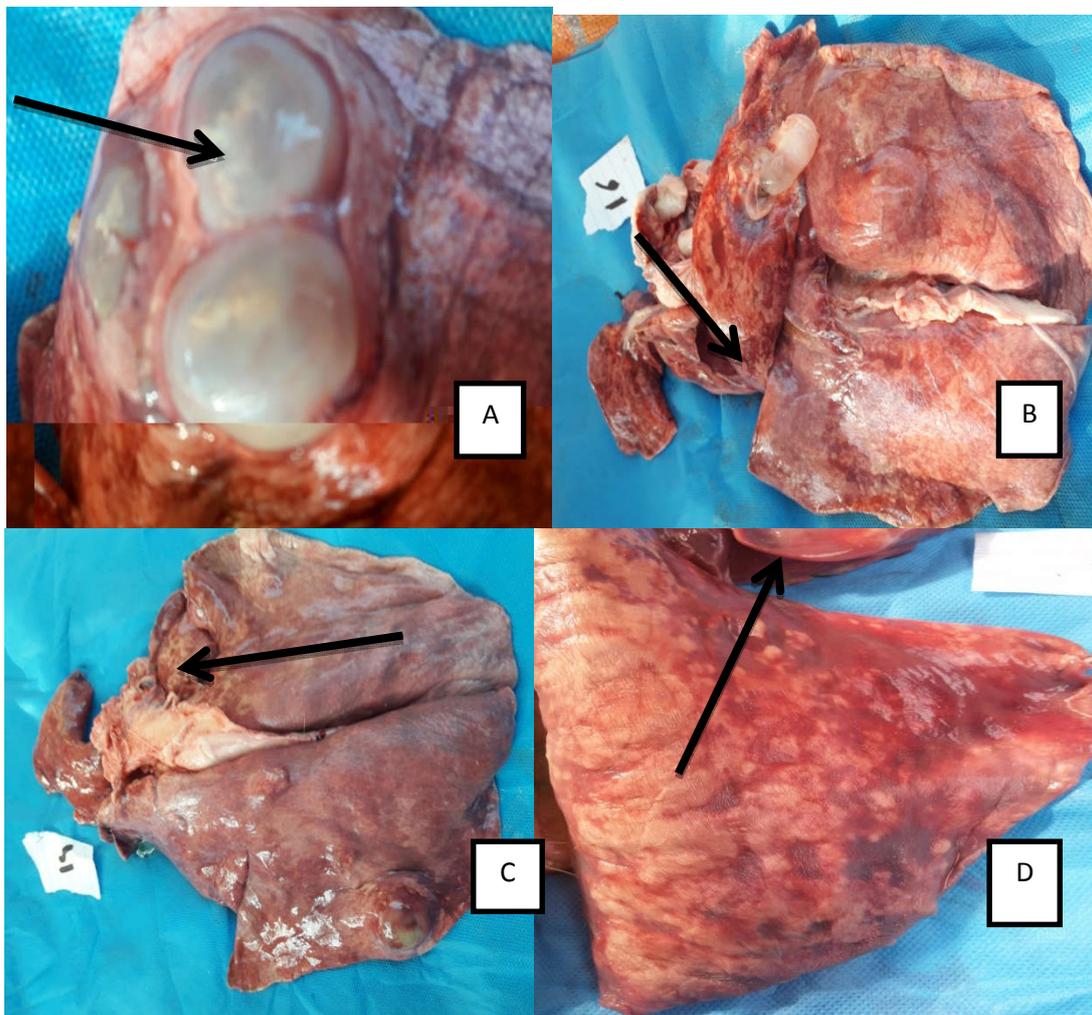
Examined lungs and cystic lesion indicated for existence of parasitism infection with *Echinococcus granulosus* or hydatid cysts. As showed in table (1). Grossly appearance showed cystic structures scattered out of lungs' surfaces. Figure 1(A,B ,C, D).Microscopically appearance showed thick wall consists of three structural component cellular laminated membrane ; germinal membrane and protoscolices. Figure 2(A, B, C, D).Heavy inflammatory response mainly neutrophils and

eosinophil's and edematous emphysematous changes with interstitial pneumonia infected lungs. Figures 3 and 4.

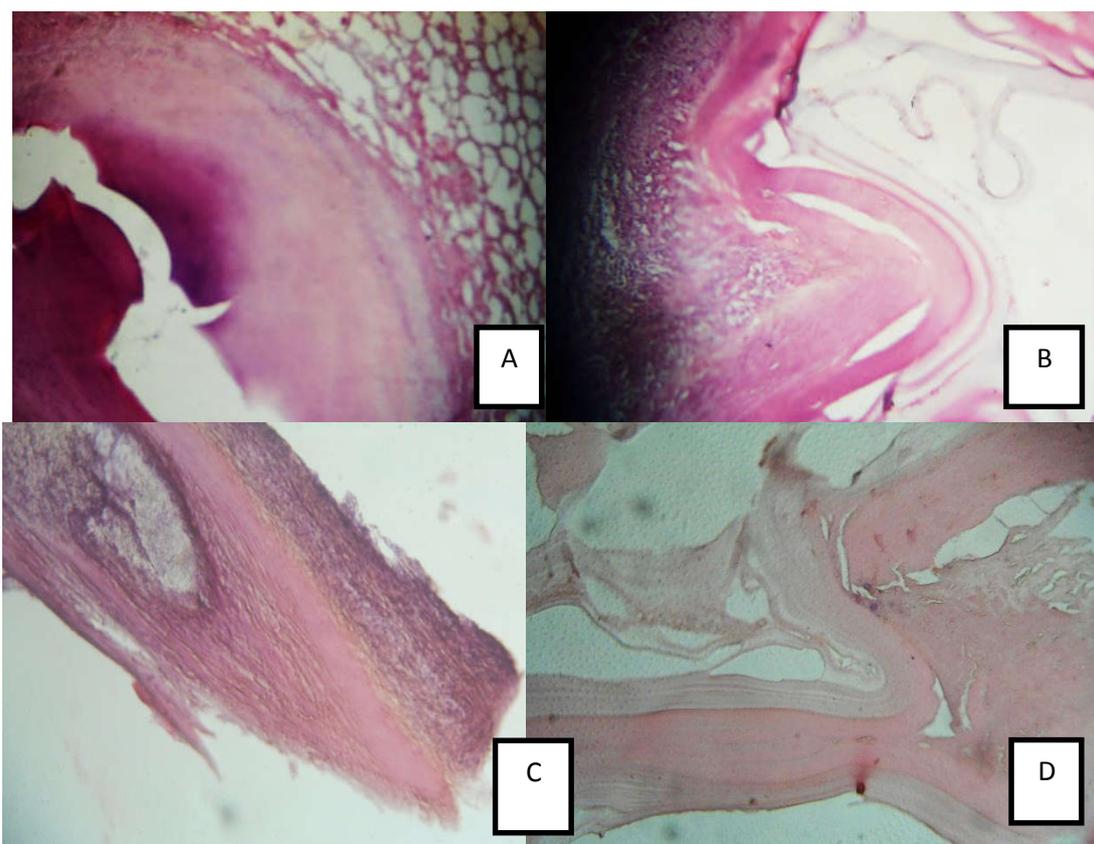
**Table (1): the species of parasite isolated from the lung sheep.**

Parasitic samples	Isolation of samples Positive	Isolation of samples Negative	Total No.
<i>Echinococcus granulosus</i> No=52	52 (52%)*	48(48%)**	100 (100%)

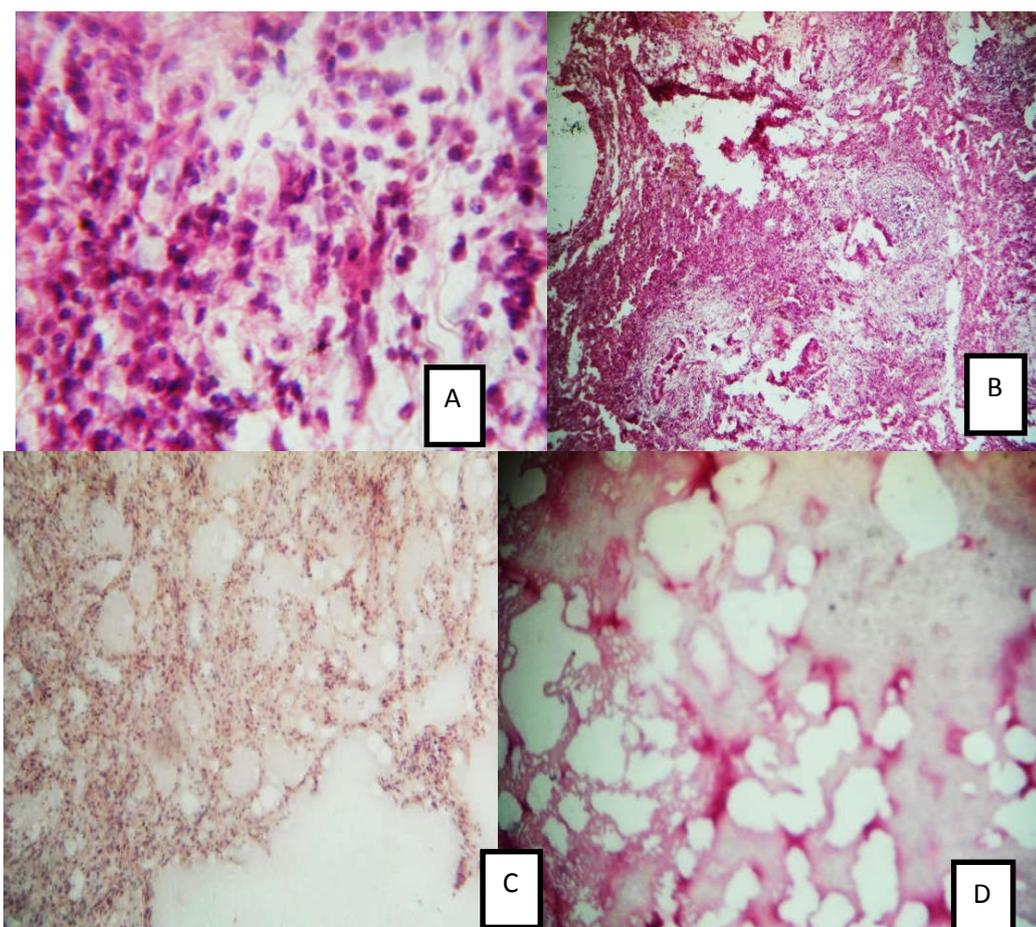
Survey results showed that there are significantly (100%) incidences of echinococcosis in all samples taken from 100 pieces of lung of infected sheep. \*:  $P \leq 0.05$  ; \*\*:  $P \geq 0.05$ .



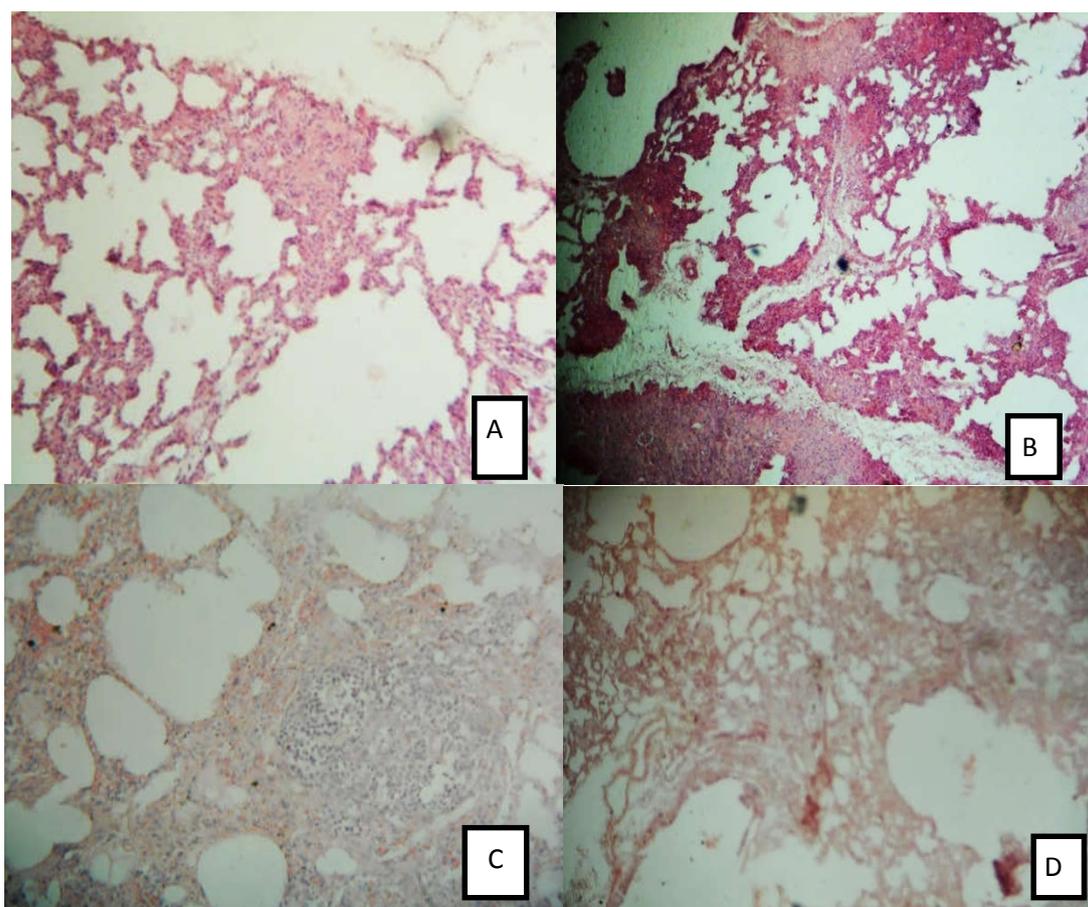
**Figure (1;A,B,C,D):Gross appearance of Hydatid cysts in examined lungs .A: caudal position;B: Ventral position C: external position D: right dorsal position**



**Figure( 2;A,B,C,D):**showed Hydatid cysts structure within lungs tissues of infected sheep.A: protoscolices B: cellular laminated membrane C:germinal membrane and protoscolices D: All layers .



**Figure 3: Lung of infected sheep showed A: neutrophils infiltration with necrotic debris, B: eosinophil's beside neutrophils infiltration within interalveolar space .C: edematous fluid filled interstitium .D: emphysema with edematous and interstitial Pneumonia**



**Figure 4: affected lungs showed A: interstitial Pneumonia with emphysema look like tree branches': emphysema with formation of fibrotic knobs .C: hemolytic changes due digestion and destruction's tissue from parasitic effects .D: emphysema and local eosinophil's infiltration with hemolytic changes.**

Microscopic appearance of infected lungs showed that there are severe hemolytic changed due to tearing effects of scoliosis of parasites associated pus cell from immune heavy immune response .

Results of field work showed that there are highly incidences of *Echinococcus granulosus* infection in Kerbala are disagreement with those reported in Mosul which 9.3% ,the causes may be attributed to many factors as homing of many dogs whom play active role in occurrences of hydatid cyst by excretes *Echinococcus granulosus* eggs at a great number of segment full of eggs with their feces containing the soil and grasses food , animal's outside's slaughterhouses usually without veterinary inspection, as well as unhealthy treatments of infected carcass (18)Parasitic infection within internal tissues mainly associated with chronic inflammation due to long time inquiry needs to parasite migration and/or maturation and also due to host's variation in each stages of infections(19)(20).Planes and

haemolysis changes accompanied with neutrophils and eosinophil's aggregations refers to damaging effects from hardening structures of parasites asprotoscolices and a solid wall, edema and fluid accumulation in interstesium represents inflammatory response and tearing effects of parasites(19)(20).. Emphysema and thickening interalveolar septa results from assistance of harmful changes and heavy inflammatory reactions (21)(22).

Conclusions: Examined samples showed that infected lung reported as significantly value (100%) occurrence of *Echinococcus granulosus* or hydatid cysts infections refers to commonly parasitic infection occurs in sheep living in Kerbala/Iraq.

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