Natural heavy infection with immature sarcocysts of *Sarcocytis spp.* in sheep in Mosul city: A case report

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Abstract

This study included recording the natural heavy infection with immature macrocysts (Sarcocysts) of *Sarcocytis spp*. in sheep. The sheep is one years old which is slaughtered at butcher shop at Mosul city in May 2018. This is the first case recorded of natural infection with immature sarcocysts of *Sarcocystis spp*. in Mosul city. Many of small nodules were observed during slaughter, these nodules are seen within esophageal muscles in different sizes and shapes, they were distributed randomly throughout esophageal muscles. Most of the sarcosystis were small in size the mean of size between 20-28×28-42 µm they were histological examination showed that presence of only metrocytes. This confirmed the diagnosis that the sarcocysts were immature macrocysts (sarcocysts) for the *Sarcosystis spp*. In our study, heavy infected case with Sarcocystis reveals the fact that large numbers of cats(final hosts) in contact with sheep in pastures is considered the main risk factor for infection and feed with raw meat from infected sheep, which is very important for carcass condemnation when the meat inspection when abnormalities are found which indicate that the part of carcass, is unfit for human consumption it is condemned, which means the economic loss for livestock.

Keywords: Sarcocysts, *Sarcocytis* spp, Sheep, Heavy infection, Natural

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حالة إصابة طبيعية شديدة بالأكياس العيانية غير الناضجة لطفيلي *Sarcocytis spp.* في الأغنام في مدينة الموصل: تقرير حالة

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الخلاصة

تضمنت الدراسة تسجيل حالة ولأول مرة في الضأن إصابة طبيعية شديدة بالأكياس العيانية غير الناضجة لطفيلي *Sarcocystis spp*. في ضأن بعمر حوالي سنة ذبح في احدى محلات القصابة في مدينة الموصل في شهر أيار عام ٢٠١٨ حيث تم ملاحظة أعداد كبيرة من الأكياس العيانية منتشرة بشكل عشوائي على طول عضلة المريء وبأشكال مختلفة بين البيضوي والكروي وبأحجام مختلفة ومعظم الأكياس كانت صغيرة الحجم حيث تراوحت بين ٢٠-٢٨ × ٢٨-٤٢ مايكرومتر، وعند فحص المقاطع النسيجية لهذه الكياس تبين احتوائها على خلايا الأم Metrocytes فقط مما يؤكد تشخيصها بانها اكياس عيانية غير ناضجة لطفيلي *Sarcocystis spp*. في هذه الدراسة تبين الحالة الشديدة الإصابة بطفيلي *Sarcocystis spp*. بانه يوجد اعداد كبيرة من القطط (مضائف نهائية للطفيلي) مع الأغنام أثناء الرعي بالحقول وبالتالي يؤدي الى الحصول على لحوم مصابة واثناء الفحص العياني بالمجزرة سوف تزال الاجزاء الغير مرغوب بها للاستهلاك البشري وهذا يعني خسارة اقتصادية للثروة الحيوانية.

Introduction

Sarcosporidiosis that has high prevalence in sheep causes micro and macrocystis (muscular sarcocysts) in skeletal and cardiac muscle related to the final hosts (dogs or cats) respectively. The Sarcocystis protozoan parasite belong to the phylum Apicomplexa, Family Sarcocystidae and the Sarcocystis species follow an obligatory two hosts life cycle, alternating between an intermediate host (prey-sheep) and definitive host (predator - dogs or cats). Both *Sarcocystis gigantea* and *Sarcocystis medusiformis* are responsible for developmental of macroscopic cysts in muscles of sheep (1-3). Although the infection of sarcosporidiosis in sheep are not zoonotic but the importance of the infection lies in the carcass condemnation is justified on the basis of the negative visual impact that cysts may have on the consumer (4-7).

Material and methods

Sheep at the first year of age, slaughtered at one of butcher's shop, through the microscopical examination of carcass found large number of small nodules in esophageal muscles were randomly distributed with in the esophageal muscles. The portion of esophagus about 40 cm were resected and transported to lab of parasitology for macroscopic examination sarcosystis of sarcosystis were counted and collected about 30 cysts then measured the cysts by ocular micrometer (8). Cysts were prepared for light microscopically by then fixed in 10% neutral buffered formalin. Processing for histological examination the cysts were embedded in paraffin wax, sectioned at 5 µm and stained with H&E (9).

Result

Macroscopically, the immature macrocysts were detected by gross examination in the muscles of esophagus of sheep. The morphological randomly features of macrocyts were white, rounded or oval cysts heavily distributed throughout esophageal muscles. (Figure 1). Immature sarcocysts were approximately measured 33 µm in length and 25µm in width (Table 1). Histologically, most of sarcocysts appeared to contain only metrocytes (Figure 2). According to the morphology and size of the cysts as well as microscopical examination most of cysts were immature sarcocysts in the esophagus.

Table 1: The size of immature macrocysts in esophagus of a sheep (n=30 cysts)

Width		length	
Mean ±D	Rang	Mean ±SD	Rang
25 ±2.7	20-28	33± 5.1	28-42

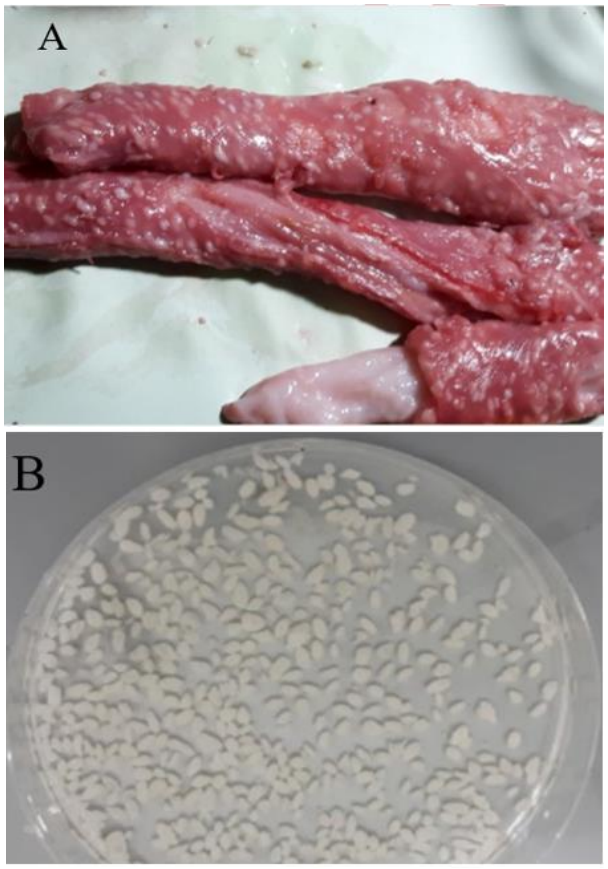

Figure 1: Esophagus with heavy infection macrocystes (A), white rounded and oval cysts (B).

Discussion

Due to difficulty of diagnosing of Sarcosporidiosis in living sheep and the difficulty of examining whole carcass by veterinarians in private butcheries and in our study the only heavy infected sample (esophagus) is difficult to be obtained in other infected muscles.

Most species of Sarcocystis that infect domestic animals are specific species for the intermediate host (10). Sheep are intermediate hosts for the Sarcocystis, *Sarcocystis gigantea* and *Sarcocystis medusiformis*, which are transmitted by felids (11). In our study, heavy infected cases with Sarcocystis reveals the fact that large numbers of cats in contact with sheep pastures is considered the main risk factor for infection and supply of raw meat from infected sheep carcasses which contributes significantly to the propagation of Sarcosporidiosis by Sarcocystis (12).

Our study also showed that the infection only with heavy immature macrocysts in young sheep at one year old might probably occurred by either ingested (high dose) of oocysts or sporocysts of Sarcocystis at the same time or at short exposure time with grass contaminated grass with

faeces of the infected cats; or due to slow or gradual development of immature macrocysts (13,14) these results confirmed by (15-17) who mentioned that immature Sarcocystis developed in the esophagus and tongue from 1.3 to 4 and 6 months post infection in their experimental study with *Sarcocystis gigantea* and *Sarcocystis medusiformis.* Our morphological study revealed that immature cysts vary in shape and size it appears at the round or oval and size ranging from 20-28 x 28-42 µm, this is identical to study done by (14-19).

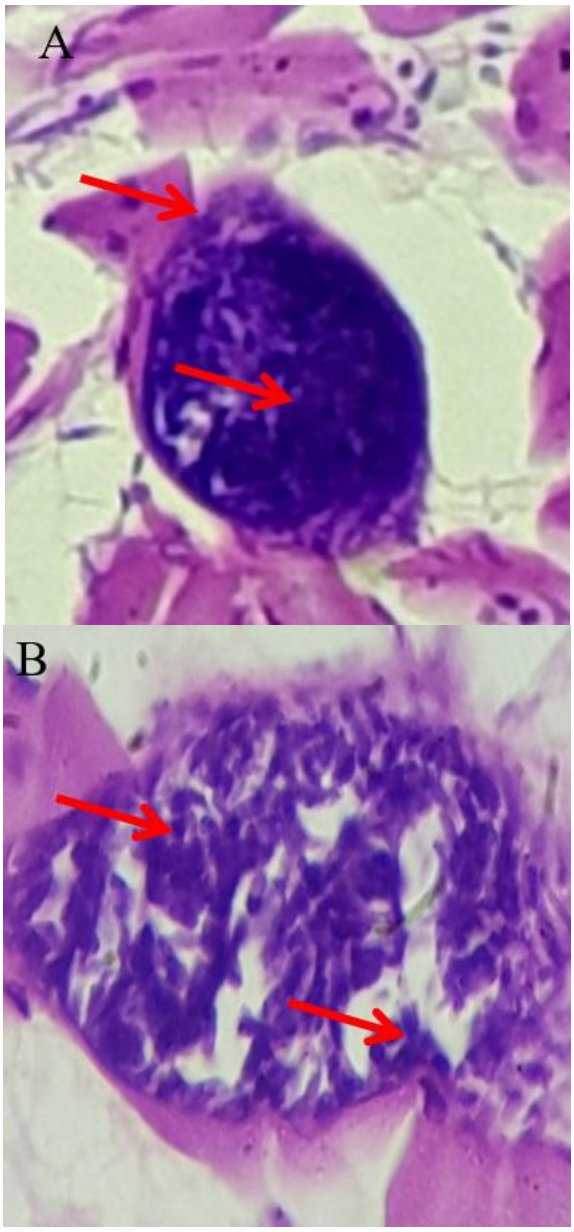

Figure 2: Immature macrocysts of *Sarcocystis spp.* contain only metrocystes. H&E, 200x (A), 560x (B).

While our histological study of macrocysts approved that all of macrocysts contain only meterocytes similar to observations by (15) his result revealed that firstly in the cross section of immature cysts contain only metrocytes, while mature cysts containing both metrocytes and merozoites and he added that metrocytes which appeared are closely packed, vesicular cells with definite basophilic nuclei in hematoxylin and eosin stained section, additionally the cyst wall of the immature macrocysts was not measurable at light microscopy of which is important for the differentiation between the species of sarcocysts (10,14,20).

According to (21) the veterinarians working as official meat inspectors at the abattoir, who systematically examined the external surfaces of the carcass, esophagus, heart, diaphragm, peritoneum and pleura to detect macrocysts Sarcocystis species. According to the above-mentioned legislation, partial carcass condemnation when one or more cysts in one organ in this case it is trimmed off. While total execution performed when macrocysts were found in two or more organs (20).

Conclusion

The natural heavy infection with immature macrocysts (Sarcocysts) of *Sarcocytis spp*. in sheep. Most of the macrocysts (Sarcosysts) were small in size the mean of size between 20- 28×28-42 µm they were histological examination showed that presence of only metrocytes. This confirmed the diagnosis that the sarcocysts were immature macrocysts (sarcocysts) for the *Sarcosystis* in sheep. It should be the veterinarians working as official meat inspectors at the abattoir, who systematically examined the external surfaces of the carcass, such as esophagus, partial organ condemnation when one or more cysts in one organ in this case it is trimmed off.

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Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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