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Sarcocystosis in slaughtered food animal in some Egyptian abattoirs.

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Abstract:

Sarcocystis species are pathogenic protozoa that infect wide range of domestic animals. The present study was carried out in slaughtered food animals of different abattoirs at Giza Governorate to determine the prevalence of sarcocyst (macrocyst and microcyst) in buffaloes, cattle, sheep and camel. A total of 800 slaughtered food animals (200 each of buffaloes, cattle, sheep and camel) were examined for the presence of sarcocysts by naked eye, impression technique, digestion technique and histopathological examination.

The incidence of macroscopic cysts in aged buffaloes, cattle and sheep were 48.66 %, 33.66 % and 16 %,respectively, While microscopic cysts in those animals were 68.66 %, 46.33 % and 28.66 %, respectively. The macroscopic cysts in young buffaloes, cattle and sheep were 43.33 %, 23.66 % and 9.66 %,respectively, While microscopic cysts in those animals were 60%, 29.66 % and 19 % respectively. Neither macrocyst nor microcyst could be detected in slaughtered camel. The incidence of both macrocyst and microcyst were highest in the esophagus followed by diaphragmatic muscles then intercostal muscle mainly. Macroscopic cysts ranged in size from 1.4 to 20.0 mm × 2.0 to 7.0mm, with very thick cyst wall. This cyst was spindle or fusiform in shape and consisted of opaque bodies, milky white in colour, lying between muscle bundles parallel to the longitudinal axis of the muscle mass.

In these organs, macrocysts were found either just beneath the serosal surface, as in esophagus, or deep in the muscular layer, as in diaphragm and intercostal muscle

Humans also may be intermediate host, therefore will be in risk when eating raw or improperly cooked meat from infected animals. Resulting in intestinal sarcocystosis which potentially of public health importance.

Key Words: Sarcocystis, Macrocyst, Microcyst.

Introduction:

Sarcocystis is a zoonotic and parasitic disease commonly seen in domestic animals such as buffaloes, cattle, and sheep. Sarcocystis is important in terms of public health, as meat and meat products are the main source of infection in human beings, who become infected when ingesting well-developed tissue cysts containing bradyzoites **(Juyal and Bhatia., 1989)**

Sarcocystis species are intracellular protozoon parasites with an intermediate-definitive host life cycle based a prey-predator relationship. Each host may be infected with more than one Sarcocystis spp.

Sarcocystis species are generally considered non-virulent for cattle, S. hominis infestation was occasionally associated to eosinophilic myositis **(Wouda et al., 2006 and El-Dakhly et al., 2011)**. Condemnation of beef due to the presence of S. hirsute macroscopic cysts was reported **(Dubey et al., 1990)**. The signs of infestation in cattle, when apparent, involve reduced weight gain, anorexia, fever, muscle weakness and eosinophilic myositis, reduced milk yield, abortion and death **(Dubey et al., 1989b and Vangeel et al., 2012)**.

Although macroscopically visible as well as microscopic sarcocystis appear to be common in slaughtered animals (in many countries most investigation on sarcocystis infections have been done by naked eye examination).

Humans may be intermediate host; therefore will be in risk when eating raw or improperly cooked meat from infected animals resulting in intestinal sarcocystosis – potentially of public health importance – **(Bunyaratvej et al., 2007).** Therefore the present study was carried out to determine the prevalence of the Sarcocystis in buffaloes, cattle, sheep and camel in abattoirs at Giza Governorate, Egypt.

Material and methods:

1- Collection of samples

A total of 800 slaughtered animals in abattoirs at Giza Governorate, Egypt (200 of each of buffaloes,

cattle, sheep and camel) were examined for macroscopic and microscopic cyst in the period between December 2014 to September 2015. The slaughtered animals were examined at abattoirs by naked eye, then about 50g Samples of esophagus, diaphragmatic muscle and intercostal muscle from each slaughtered animal transferred to the laboratory in polyethylene bag and kept in an ice box for microscopic examination by both digestion and impression techniques. Histological samples were kept in formol saline 10% till processed in National Cancer Institute Cairo.

2- Techniques of examination:

2.1- Macroscopic (Naked eye) inspection was carried out in slaughtered animals in abattoir to detect the presence of macroscopic sarcocyst.

2.2- Microscpical examination was done by:

2.2.1- Impression technique:

Small pieces of muscle (about 3 ×5 mm dimensions, 1-2 mm thickness) after removal of fat and connective tissue were compressed between two glass slides and examined for microscopic Sarcocysts **(Collins, 1981)** the samples were examined under the stereomicroscope (X 16 magnification). Sarcocysts were microscopically having nearly similar sizes and shape but some cysts may have undulating edges which confined mainly to the oesophagus.

2.2.2- Digestion technique:

About 10 g of each muscle sample minced using blender then digested at 40°C for 30min in a flask containing 50 ml of digestion solution (1.3g pepsin, 3.5 ml HCL and 2.5 g NaCL in 500 ml distilled water). The digested solution poured through a wire mesh screen with an aperture of 0.25 mm, centrifugated in tubes of conic bottom by (MPW-04-347warszawa- Poland) at 1500 rpm for 10 min, after discarding the supernatant 1-2 drops of the sediment were fixed in 100% ethanol on glass slides for 1.5 min. before staining with Geimsa stain and was microscopically examined for microcysts **(Florencia and Mary., 2000 and Saeid et al., 2009).**

2.2.3- Histopathological examination:

Histopatholgical examination was performed for macroscopically positive samples. About 0.5-1.0 cm from the oesophagus, diaphragmatic and intercostal muscle samples were fixed in 10 % formol saline for 24 hours. Sections of an average thickness of 3 microns was prepared and stained with Hematoxyline and Eosin according to **Mahran (2009)** then examined by light microscope.

The Sarcocysts were oval to globular in shape with thin cyst wall and slightly compartmentalized which indicated mixed infestations with both macroscopic and fusiform and/or globular to oval microscopic cysts, and mixed infestation with both types of microscopic cysts.

Results

Table (1): Prevalance of macrocysts in buffaloes, cattle and sheep in Giza abattoirs. (n= 100).

	No. of sample	Percentage positive samples					
		Buffaloes		Cattle		Sheep	
		Young< 3 years	Old≥ 3 years	Young< 3 years	Old ≥ 3 years	Young< 1.5 years	Old ≥ 1.5 years
	100	50%	55%	30%	42%	11%	17%
Diaphragmatic muscles	100	41%	47%	27%	31%	9%	15%
intercostal muscle	100	39%	44%	13%	28%	9%	16%
Average percentage		43.33 %	48.66%	23.33%	33.66%	9.66 %	16 %

Table (2): Prevelance of microcysts examination (digestion technique) in buffaloes, cattle and sheep in Giza abattoirs. (n= 100).

	No. of sa mples	Percentage of positive samples					
		Buffaloes		Cattle		Sheep	
		Young< 3 years	Old≥ 3 years	Young< 3 years	Old ≥ 3 years	Young< 1.5 years	Old≥ 1.5 years
Oesophagus	100	67%	78%	37%	58%	23%	32%
Diaphragmatic muscles	100	59%	66%	30%	45%	19%	27%
Intercostal muscles	100	54%	62%	22%	36%	15%	27%
Average percentage		60 %	68.66%	29.66 %	46.33 %	19 %	28.66 %

Egypt. While **Sayed et al. (2008)** recorded an infection rate in cattle 94 % in Egypt.

On other hand, country of higher infection rate such as India 87% **(Mohanty et al 1995)**, 79 % in Vietnam **(Huong 1999)**, and 82.9% in Iraq **(Latif et al 1999)**. Lower prevalence in other country like 57% in Iran **(Gharbanpoor et al 2007)**.However, the rate of infection reach to 100% in sheep and cattle in the United States **(Fayer 2004)**, while infection rate in Iran was 6.67% **(Atashparvar et al., 2001)**.

Examination of slaughtered animals clarified that esophagus was the organ most frequently found to be infected with either macrocyst or microcyst similar findings reported by **Fayer and Dubey (1986) and Haddadzadeh et al. (2004)**, while the heart had the lowest rate of infection in this respect, on contrary **Daryani et al. (2006)** found that the abdominal muscles of infected buffaloes were more frequently infected than the esophagus.

The present investigation showed that the size of globular to oval-shaped microcysts ranged from 19.1 to 95.9×10.2 to 68.9µm, and revealed a slightly compartmentalized arrangement of tightly packed zoites with fine septal partitions.old animal is likely to be affected more than young.

Histopathologically, macrocysts ranged in size from 1.4 to 20.0 mm ×2.0 to 7.0mm, with very thick cyst wall. This cyst was spindle or fusiform in shape and consisted of opaque bodies, milky white in colour, lying between muscle bundles parallel to the longitudinal axis of the muscle mass. In these organs, macrocysts were found either just beneath the serosal surface, as in esophagus, or deep in the muscular layer, as in diaphragm and intercostal muscle (figure 1).

The examined sarcocysts were mature and contained numerous bradyzoites and few peripheral metrocytes; all were banana or crescent-shaped with the anterior end more pointed than the posterior one **(Abu-Elwafa, S. A. et al 2012)**

Conclusion

The obtained results confirmed that the high rate of sarcocystic infestation may be due to the abundance of final hosts, especially dogs and cats, which spread the infection to buffaloes, cattle and sheep. Microscopic Sarcocystis were more prevalent than macroscopic cysts in which older animals highly infested than younger one. Esophagus was more frequently affected than diaphragm and intercostal muscles. Camels may be naturally protected against sarcocyts.

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الملخص العربى

عدوى الساركوسيستس فى انواع اللحوم فى المجازر المصرية

ا.د فتحى خلف الله-د.ناصر عبد العاطى-د.حنان قرنى
قسم الرقابة الصحية على اللحوم -كلية الطب البيطرى-جامعة بنى سويف
الهيئة العامة للخدمات البيطرية بالدقى

فى هذا البحث تم دراسة عدوى الساركوسيستس فى لحوم الجاموس والابقار والاغنام و الجمال بمجازر متنوعة بمحافظة الجيزة خلال الفترة من سبتمبر ٢٠١٤ حتى ديسمبر ٢٠١٥ حيث تم الفحص لعدد٨٠٠ عينة ٢٠٠ عينة من كل نوع من لحوم الجاموس والابقار والاغنام والجمال مقسمة الى ذبائح كبيرة فى السن وذبائح صغيرة

اشتملت تلك العينات على اجزاء من المرئ و الحجاب الحاجز وعضلات القفص الصدرى لكل حيوان

تم الفحص بالعين المجردة وكانت الاصابة الكلية ٤٣.٣٤% و ٢٣.٣٤%و ٩.٦٧% و ٠% للجاموس و الابقار و الاغنام و الجمال الصغيرة فى السن على التوالى وتم فحص بالمجهر الضوئى و كانت الاصابة كالتالى ٦٠% و ٢٩.٦٧% و ١٩% لنفس الحيوانات بعد الفحص الميكروسكوبى بينما كانت الاصابات كالتالى ٤٨.٦٧% و ٣٣.٦٧% و ١٦% و ٠% وذلك بفحص الحيوانات الكبيرة فى السن بالعين المجردة بينما عند فحصها تحت الميكروسكوب كانت النسبة كالتالى ٦٨.٦٧% و ٤٦.٣٤% و ٢٨.٦٧% و ٠% للجاموس والابقار والاغنام والجمال على التوالى

حيث تم استخدام طريقتين مختلفتين وهما طريقة الضغط بين شريحتين وكذلك طريقة هضم العضلات وصبغها بالهيماتوكسيلين اند ايوسين ثم فحصها تحت الميكرسكوب حيث سجلت عينات االمرئ اعلى نسبة اصابة سواء بالفحص بالعين المجردة او بالفحص المجهرى يليها عينات الحاب الحاجز وسجلت عينات عضلات القفص الصدرى اقل نسبة اصابة .