

Some studies on *Sarcocystis* cysts in slaughtered buffaloes at sharkia governorate

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Abstract

In this study 340 buffaloes were examined for *Sarcocystis* spp. in sharkia abattoir Egypt. Both macroscopic (*Sarcocystis fusiformis*) and microscopic (*Sarcocystis levinei*) cysts were recognized, and were differentiated by their morphological features and location in the tissues. Of 340 buffaloes examined in abattoirs in sharkia abattoir Egypt were found to be infected, with an overall prevalence of 38.23%. Depending on age, three groups of naturally infected buffaloes were examined: 140 male buffalo calves aged 1.5–2 years, 135 female buffaloes aged 3–5 years, and 65 females older than 5 years. Infection rates were 8.54%, 21.38% and 66.13% among these groups respectively. Organs examined included tongue, esophagus, and muscles of neck, diaphragm and heart. Macroscopic cysts were examined by the naked eye through meat inspection in abattoirs, while the pepsin-digestion method and the histological technique were applied to detect microscopic cysts. It has been found that esophagus showed the highest rate of infection among the infected organs, with both macroscopic and microscopic cysts seen in the infected buffaloes. Moreover, results of the pepsin-digestion method proved more accurate than those produced by the histological technique in terms of infection rates for the microscopic cysts. The high prevalence of microscopic *Sarcocystis* spp. in sharkia Governorate reflects a significant role played by stray dogs, rather than cats, in the transmission of these parasites.

Key words:

Sarcocystis. *Buffaloes*. *Skarkia* Prevalence. *Egypt*

Introduction

Sarcosporidia are protozoal parasites found in wide variety of animals and man, where more than 50 species are detected in mammals and birds (Gracey and Collins, 1992) where it causes myositis, degenerative changes and atrophy of muscles around the cysts (Sharma and Mazaheri, 1992). Three species of *Sarcocystis* were detected in buffaloes *S. fusiformis*, *S. levinei* and *S. buffalonis*, each one has a distinct cyst wall structure. *S. fusiformis* and *S. buffalonis* form macroscopic sarcocysts and are transmitted to buffaloes via feces of cats, while *S. levinei* forms microscopic sarcocysts and is transmitted to buffaloes via feces of dogs (Huong *et al.*, 1997).

Sarcocystis spp. is a cyst-forming coccidian parasite which needs two obligatory hosts during its life cycle, including a carnivorous final host and an herbivorous intermediate host (Soulsby 1982). Each host may be infected with more than one *Sarcocystis* spp. (Bhatia 2000). Sarcocystosis is a zoonotic and parasitic disease commonly seen in domestic animals such as buffaloes, cattle, and pigs. Among these, *Sarcocystis sui hominis* 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). In animals,

infection by some of the *Sarcocystis* spp. can lead to anemia, loss of weight, abortion, and even death in cases of severe infections (**Dubey *et al.*, 1989**). Sarcocystosis is found worldwide. Most investigations have concerned the prevalence of *Sarcocystis* spp. infection in esophagus, heart, tongue, diaphragm, and intercostal muscles of slaughtered cattle and buffaloes. In this paper, we focus on the prevalence of both macroscopic and microscopic *Sarcocystis* spp. cysts in organs of slaughtered buffaloes in sharkia Governorate, Egypt. In this paper, we focus on the prevalence of both macroscopic and microscopic *Sarcocystis* spp. cysts in organs of slaughtered buffaloes in sharkia Governorate, Egypt.

Materials and methods

Study area and animals A total of 340 buffaloes (classified into three groups categorized by age; the first included 140 young male buffalo calves aged 1.5–2 years, the second 135 adult female buffaloes aged 2–5 years, and the third 65 females aged more than 5 years) were surveyed for the presence of sarcocysts. Animals slaughtered in abattoirs in sharkia Governorate, Egypt were collected from different areas of the province, and sent to the laboratory of Parasitology, animal health research lab. Zagazig Egypt. Tissue samples from tongue, esophagus, and muscles of neck, diaphragm and heart were taken from each freshly slaughtered animal and preserved in properly labeled ice bags that were transported from the slaughterhouse as early as possible to the Parasitological Laboratory for further investigation (**Huong 1999**). Specimens were kept refrigerated prior to examination. Techniques

For macroscopic cysts, examination was done by the naked eye through meat inspection at the abattoir by the veterinarians. Microscopic cysts were examined by two methods: Pepsin-digestion method Approximately 10 gm of each tissue organ of the examined animals was minced and digested for 30 min at 40°C in 50 ml of digestion solution containing 1.3 gm pepsin, 3.5 ml HCl, and 2.5 gm NaCl in 500 ml of distilled water. The digested solution was poured through a fine-mesh sieve into a beaker and the filtrate was allowed to settle for 30 min. The supernatant was discarded and the sediment was microscopically examined at × 400 magnifications (**Saeid *et al.*, 2009**). Histomorphological studies freshly collected muscle samples from *Sarcocystis* infected buffaloes were fixed in 10% neutral buffered. formalin solution, dehydrated in graded ethyl alcohol, embedded in paraffin, cut at 5-µm thickness and processed routinely for hematoxylin and eosin staining (**Avapal *et al.*, 2004; Mahran 2009**).

Results and Discussion

Table (1). Prevalence of *Sarcocystis* in the examined slaughtered buffaloes.

No. of examined animals	Infected animals		Macroscopic cysts		Microscopic cysts		Mixed infection	
	No.	%	No.	%	No.	%	No.	%
340	130	38.82%	32	9.41%	98	28.82%	130	38.23%

Table (2). Seasonal prevalence distribution of *Sarcocystis fusiformis* among slaughtered buffaloes at Sharkia abattoirs.

Duration	Age of the animals	No. of slaughtered buffaloes		% Of infection
		Examined	Infected	
Spring	Y. (less than 3 years)	10	0	0%
	O. (more than 3 years)	18	4	22.2 %
Summer	Y. (less than 3 years)	5	1	20%
	O. (more than 3 years)	20	3	15%
Autumn	Y. (less than 3 years)	0	0	0%
	O. (more than 3 years)	23	4	17.4 %
Winter	Y. (less than 3 years)	15	0	0%
	O. (more than 3 years)	9	3	33.3%
Total	Y. (less than 3 years)	30	1	3.3%
	O. (more than 3 years)	70	14	20%

Table (3). Incidence of macroscopic cysts in different organs of slaughtered buffaloes by naked eyes.

Tissue Age (years)	Tongue		Esophagus		Neck		Diaphragm		Heart		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1.5-2 (n=140) Male calves	2	1.42	4	2.85	3	2.14	2	1.42	1	0.71	12	8.54
2-5 (n=135) Female calves	5	3.70	7	5.18	3	2.22	12	8.8	2	1.48	29	21.38
Over 5 years (n=65) Female aged	14	21.53	13	20	8	12.3	6	9.23	2	3.07	43	66.13

Table (4). Detection of microscopic cysts *S. Livenie* in the infected buffaloes using the histological technique.

Organ \ Age/year	1-3 Years no. 140		3-5 Years no. 135		More than 5 years no. 65	
	No.	%	No.	%	No.	%
Tongue	12	8.57	16	11.85	24	36.92
Esophagus	102	72.85	90	66.6	40	61.5
Ms. Of Neck	4	2.85	27	20	18	27.6
Diaphragm	6	4.28	8	5.92	3	4.6
Heart	2	1.42	3	2.22	6	9.2

Discussion

In the present investigation, of tongue, esophagus, and muscles of neck, diaphragm and heart were found to be the most common sites for *Sarcocystis* spp. infection in buffaloes (**Oryan *et al.*, 2010**). Results of the present work indicated a high prevalence of *Sarcocystis* fusiformis cysts in young male buffaloes 8.54%, young female calves 21.38%, and old females 66.13% similar results obtained by (**Latif *et al.*, 1999** and **Khalifa *et al.*, 2008**). Meanwhile, higher results were recorded by (**Huong, 1999; Daryani *et al.*, 2006** and **Mona, 2010**). infection among slaughtered buffaloes in the region of sharkia, Egypt, and this suggests that buffaloes are frequently exposed to infection due to their close relationship with dogs, cats, and even wild animals that act as final hosts for these protozoa. Similar results were obtained by (**Said, 1996**), who found an infection rate of 76.8% in Assiut Governorate. He added that elderly buffaloes were more commonly exposed to infection. Similar results were obtained by (**Fawaz, 1998**), who detected an infection rate of 72.6% in examined buffaloes in Qena Governorate, Egypt. Higher infection rates have also been recorded in other countries that have similar climatic conditions, such as 87% in India (**Mohanty *et al.*, 1995**), 79% in Vietnam (**Huong, 1999**), and 82.9% in Iraq (**Latif *et al.*, 1999**). Evidently, distribution of sarcocysts does not follow a specific pattern in most of the infected organs in buffaloes, with the exception of macroscopic cysts, which tend to be located in the esophagus. In addition, hearts of these animals do not usually contain any macroscopic forms. Felids are known to be the definitive hosts of macroscopic sarcocysts, whereas canids are considered to be the final host of microscopic forms (**Dubey *et al.*, 1989**). In the present study, macroscopic cysts were found to be far less prevalent than microscopic cysts, which were probably due to infrequent opportunities for cats to be in contact with buffaloes; the latter are commonly found on farms or even.

In village houses, while cats are viewed as pets and are usually found in cities. On the other hand, candies play a wide spectrum of roles in transmitting the infection to a number of ani-

mals. This occurs because dogs are commonly found in close contact with buffaloes and other ruminants. The frequent contact between buffaloes and household and/or stray dogs, together with the feeding habits of dogs that allow the ingestion of infected raw offal from the slaughtered animals in abattoirs, keep the life cycle active and consequently promote the spread of infection. In this manner, the presence of infected dogs causes the dissemination of large numbers of sporocysts via feces, thus increasing the exposure of buffaloes to infection. Contamination of feed, drinking water, and pastures by disseminated *Sarcocystis* spp. sporocysts is the main source of infection for buffaloes. Thus, infection of intermediate Hosts play an important role in inducing a high prevalence of microscopic cysts. Humans also can act as intermediate hosts, and are thus at risk when eating raw or improperly cooked meat from infected animals. This can result in intestinal sarcocystosis, and is potentially important in terms of public health (**Bunyaratvej *et al.*, 2007**). We have reported here that all of examined buffaloes that were infected with macroscopic sarcocysts were also infected with the microscopic forms; this implies that these animals were in contact with both felids and candies. It has been stated that infected dogs can shed millions of sporocysts daily, and these stages will be infective just after dissemination with feces of the final host. This explains the high prevalence of microscopic sarcocysts in areas where dogs are present, denoting the epidemiology possibility of infection in buffaloes aged 1.5 years and older, with some variations in groups under 2 years and those above, but with no significant differences. We were unable to use animals younger than 1 year old in the present study, as regulations governing abattoirs in Egypt do not allow slaughtering before this age. Moreover, it has been suggested that geoclimatic conditions in Beni-Suef area, including high temperatures and high relative humidity, may increase the survival and persistence of sporocysts shed from infected dogs. This finding is consistent with that reported by (**Gharbanpoor *et al.*, 2007**).

The obtained results confirmed that Egyptian

domestic buffaloes are widely infected with *Sarcocystis* spp. This high infection rate may be due to the abundance of final hosts, especially dogs and cats that encourage the spreading of infection by this protozoan. Authors concluded that microscopic sarcocysts, *S. levinei*, were more prevalent than macroscopic cysts, *S. fusiformis*.

It can be concluded that, the higher infection of old animal due to consumption of contaminated grasses or herbage with sporocysts.

References

- Avapal, R.S., Sharma, J.K., and Juyal, P.D., (2004).** Pathological changes in *Sarcocystis* infection in domestic pigs (*Sus scrofa*), *Veterinary Journal*, 168, 358–361.
- Bhatia, B.B., (2000).** Textbook of Veterinary Protozoology, 1st Edition (ICAR, New Delhi), pp. 220.
- Bunyaratvej, S., Unpunyo, P., and Pongtippan, A., (2007).** The *Sarcocystis*-cyst containing beef and pork as the sources of natural intestinal sarcocystosis in Thai people. *Journal of the Medical Association of Thailand*, 90, 2128–2135.
- Daryani, A., Alaei, R., Dehghan, M.H., Arab, R., Sharif, M., and Ziaei, H., (2006).** Survey of *Sarcocystis* infection in slaughtered sheep and buffaloes in Ardabil, Iran, *Journal of Animal and Veterinary advances*, 5, 60–62.
- Dubey, J.P., Speer, C.A., and Fayer, R., (1989).** *Sarcocystosis* of animals and man, (CRC, Press, Boca Raton).
- El-Dakhly K.M.; El-Nesr K.A.; El-Shaymaa El-Nahass; Akihiro Hirata; Hiroki Sakai and Tokuma Yanai (2011).** Prevalence and distribution patterns of *Sarcocystis* spp. in buffaloes in Beni-Suef, Egypt. *Trop Anim Health Prod* (2011) 43:1549–1554, DOI 10.1007/s11250-011-9840-2.
- Fawaz, A.A., (1998).** Incidence of *Toxoplasma* and *Sarcosporidia* in Slaughtered Animals in Qena Governate, (unpublished PhD thesis. Faculty of Veterinary Medicine, Assiut University).
- Gharbanpoor, M., Hamidinejat, H., Nabavi, L., Khadjeh, G.H., and Razi Jalali, M., (2007).** Evaluation of an ELISA for the diagnosis of sarcocystosis in water buffaloes, *Bulletin of The Veterinary Institute in Pulawy*, 51, 229–231.
- Gracey, J.F. and Collins, D.S. (1992).** *Meat Hygiene*, 9th Ed. EIBS, Bailliers Tindall, London, pp. 635.
- Huong, L.T.T., Dubey, J.P., TapioNikkila and Arvid Ugglä. (1997).** *Sarcocystis Buffalonis* n. sp. (Protozoa: Sarcocystidae) from water buffalo (*Bubalus bubalis*) in Vietnam. *J. Parasit.* 83: (3)471-474.
- Huong, L.T., (1999).** Prevalence of *Sarcocystis* spp. in water buffaloes In Vietnam, *Veterinary Parasitology*, 86, 33–39.
- Juyal, P.D., and Bhatia, B.B., (1989).** Sarcocystosis: An emerging zoonosis, *Indian Veterinary Medical Journal*, 13, 66–69.
- Khalifa R.M.; El-Nadi, N.A.; Sayed, F.G. and Omran, E.K. (2008).** Comparative morphological studies on three *Sarcocystis* species in Sohag, Egypt. *J. Egypt Soc. Parasitol.*, 38(2): 599-608.
- Latif, B.M.A.; Al-Delemi, J.k.; Mohammed, B. S.; Albayati, S. M. and Al-Amiry, A.M. (1999).** Prevalence of *Sarcocystis* spp. in meat-producing animals in Iraq vet parasit. 84 (1-2): 85-90.
- Mahran, O.M., (2009).** *Sarcocystis* infection in sheep and goats slaughtered in Shalatin abattoir, Red Sea Governorate, Egypt, *Assiut Veterinary Medical Journal*, 55, 341–355.
- Mona M. Ibrahim (2010).** Studies on zootocysts of *Sarcocystis* in buffaloes M. V. Thesis. Faculty of Veterinary Medicine Zagazig University.
- Oryan, A., Ahmadi, N., Mostafa, S., and Mousavi, M., (2010).** Prevalence, biology

- and distribution pattern of *Sarcocystis* infection in water buffalo (*Bubalus bubalis*) in Iran, *Tropical Animal and Health Production*, 42, 1513–1518.
- Saeid, R., Nourollahi, F., Masoud, A., and Fatemeh, N., (2009).** Survey of *Sarcocystis* infection in slaughtered cattle in Kerman, Iran, *Tropical Animal and Health Production*, 41, 1633–1635.
- Said M.S. (1996).** Muscular parasites in slaughtered Animals in Assiut Governate. (Unpublished PhD thesis, Faculty of Veterinary Medicine Assiut University).
- Sharma, R.N and Mazaheri, Y. (1992).** Eosinophilic myositis in a goat. *Vet. Med. Rec.* 130, 16: 359.
- Soulsby, E.J.L. (1982).** *Helminthes, Arthropoda and Protozoa of domesticated animals*, 6th Edition (Baillier, Tindall and Casell, London).
- Yassein, M.A.M. (1984).** Muscular parasites in slaughtered camels. Ph. D. Thesis, Fac. of Vet. Med. Cairo Univ.

بعض الدراسات علي انواع الساركوسيسيت علي الجاموس المذبوح بمحافظة الشرقية

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الملخص العربي

اجريت هذه الدراسة علي ٣٤٠ حيوان من اعمار مختلفه من الجاموس ذكور واثان وتم تجميعها من مجازر بمحافظة الشرقية من محافظة الشرقية بمصر وتم فحص ساركوسيسيت فيوزيفورميز ظاهريا ومجهريا لحويصلات الساركوسيسيت ليفني وتم التفريق بينهما وكان معدل نسبة الاصابه ظاهريا ومجهريا ٣٨,٢٨% .
تم تقسيم الحيوانات الي ٣ مجموعات: ١٤٠ عجول ذكور (يتراوح عمرها من ١,٥ الي ٢ سنه) و ١٣٥ اناث جاموس (عمرها من ٣ الي ٥ سنه) و ٦٥ اناث (عمرها اكثر من ٥ سنوات) وكانت نسبة الاصابه ٨,٥٤% و ٢١,٣٨% و ٦٦,١٣% بين هذه المجموعات علي التوالي كما تم فحص بعض الاعضاء العضليه (اللسان – المرئ – عضلات الرقبه – الحجاب الحاجز والقلب) بينما تم استخدام طريقة الهضم والفحص الهيستولوجي للتعرف علي الحويصلات المجهريه وظهرت الدراسة ان المرئ هو الاعلي اصابه بين هذه الاعضاء المفحوصه.
ويرجع ارتفاع نسبة الاصابه لانتشار الكلاب الضاله ودورها في نقل العدوي من خلال الغذاء الملوث للحيوان عن طريق الفم.