

Survey of *Sarcocystis* Infection in Slaughtered Sheep and Buffaloes in Ardabil, Iran

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Abstract: The parasites of genus *Sarcocystis* are among the most commonly found parasites in domestic ruminants and some species of *Sarcocystis* can generate important economic loss when causing clinical and subclinical disease. The aim of this study was to determine the prevalence of *Sarcocystis* in slaughtered sheep and buffaloes in Ardabil, Iran. This cross-sectional study was carried out between May 2004 and February 2005. A total of 2110 sheep and 357 buffaloes were investigated. The prevalence of *Sarcocystis* unspecified species cysts in sheep were detected in 33.9% (716/2110): in the abdominal wall of 31.3%, diaphragm of 22.4%, intracostal of 16.6%, arm of 2%, thigh of 1.5%, rectus or neck of 0.75% and esophagus of 0.23%. Its prevalence in buffaloes was 8.12% (29/357). The prevalence of infection was highest in the entire females ($p < 0.001$).

Key words: *Sarcocystis*, sheep, buffaloes, Iran

INTRODUCTION

The parasites of genus *Sarcocystis* are among the most commonly found parasites in domestic ruminants and some species of *Sarcocystis* can generate important economic loss when causing clinical and subclinical disease^[1,2]. Pigs with heavy infections of 40 sarcocysts or more per gram of diaphragm showed symptoms of weakness of loins, muscular stiffness, and temporary posterior paralysis. Lesions include enlargement and paleness of kidneys and inflammations of the mucosa of the stomach and intestine.

Heart, diaphragm, and skeletal muscles are the preferred organs for *Sarcocystis* sp. location in the intermediate host and can persist through life in the hosts but many start to disappear after three months of inoculation^[2]. Meat that is heavily infected may be condemned as unfit for human consumption^[3]. Eating raw or undercooked beef and pork containing mature sarcocysts of *S. hominis* and *S. suis*, respectively, has resulted in humans acquiring intestinal sarcocystosis^[4]. As Ardabil province is one of the important territories for training domesticated animals the aim of this study was to determine the prevalence of *Sarcocystis* in sheep and buffaloes in this region.

MATERIALS AND METHODS

The city of Ardabil is located in northeast of Islamic Republic of Iran. This city is an animal husbandry region, and each year exports thousands heads of cattle to other

parts of Iran. Ardabil City has a big slaughter house that has been made recently, and most of cattle in Ardabil province are slaughtered in this abattoir. Number of cattle, sheep, and goats slaughtered in Ardabil (in 2004) were 19405, 87904, and 6961, respectively. Of course number of 22262 heads of cattle, and 220359 heads of sheep and goats were export to other provinces of Iran.

Study design: This cross-sectional study was carried out on slaughtered sheep and buffaloes in slaughter house of Ardabil City, Iran, between May 2004 and February 2005. Sarcocysts (macrocyts) were investigated in meat by direct observation, in 2110 and 357 heads of sheep and buffaloes, respectively.

RESULTS

The prevalence of *Sarcocystis* unspecified species cysts were detected in 33.93%, and 8.1% of slaughtered sheep and buffaloes, respectively (Table 1). The prevalence of infection was highest in the entire females ($p < 0.001$).

DISCUSSION

Sarcocystis is worldwide in distribution. Parasites belonging to this genus have been reported from numerous mammals, especially sheep, cattle, buffaloes and pigs. They occur as elongated cylindrical bodies, sometimes large enough to be visible to the naked eye, in striated muscle and some times in unstriated muscle^[3].

Table1: Prevalence of *Sarcocystis* in sheep and buffaloes in Ardabil, Iran

		Infection		Esophagus		Diaphragm		Abdominalwall	
Kindofanimal	No.ofanimals	N	%	N	%	N	%	N	%
Sheep	2110	716	33.93	5	0.23	473	22.41	661	31.32
Buffaloes	357	29	8.12	19	5.3	2	0.56	4	1.12
		Intracostal		Rectus		Tigh		Arm	
Kindofanimal	N	%	N	%	N	%	N	%	Neck
Sheep	352	16.68	16	0.75	32	1.5	42	2	16
Buffaloes	1	0.28	5	1.4	8	2.24	51.	4	27

In this study the prevalence of *Sarcocystis* unspecified species cyst in sheep and buffaloes was 33.9 and 8.1%, respectively. The most infection rate in sheep was observed in abdominal wall (31.3%), and diaphragm (22.4%). *Sarcocystis* tenella is prevalent in sheep and goats everywhere. It occurs most commonly in the upper and lower ends of the esophagus but is frequently found in the diaphragm, tongue, and heart^[3]. There are a few reports about prevalence of *Sarcocystis* in domestic animals in Iran, such as: Khoram Abad (sheep: 6.67%; goats 12.25%)^[5] and kerman (sheep: 3.58%; goats 0.13%)^[6].

Based on examination of tissues from abattoirs, a high percentage of cattle worldwide are infected with sarcocysts, with those of *S. cruzi* (infectious from cattle to canines) being the most prevalent and easiest to identify histologically^[7]. Most studies have not attempted to differentiate species of sarcocysts found in meat. The prevalence of *Sarcocystis* in Japanese and imported beef was reported, but the species were not identified^[8]. Up to 63 and 80% cattle in Germany and Madhya Pradesh (India) contained sarcocysts^[9]. In Brazil, all 50 samples of raw beef prepared as kibbe in 25 Arabian restaurants in Sao Paulo contained sarcocysts^[10]. The prevalence rate of *Sarcocystis* in other countries is as follow: Saudi Arabia (camels 88.35%)^[11], Western Australia (cattle: 52%)^[12], Japan (cattle: 90.0, sheep: 96.9%)^[13], Sri Lanka (cattle: 69.3%)^[14], and Ethiopia (sheep: 93, cattle: 82%)^[15].

Eating raw or undercooked beef and pork containing mature sarcocysts of *S. hominis* and *S. suis hominis*, respectively, has resulted in humans acquiring intestinal sarcocystosis. Based on histologic examination of intestinal lesions from persons in Thailand having eaten undercooked meat from *Bos indicus* cattle^[16], there could be other species of *Sarcocystis* from which humans acquire intestinal sarcocystosis. *S. cruzi*, the species most frequently found in cattle muscle, infects dogs but not humans^[17], but several species of domesticated meat animals harbor sarcocysts infective for unknown definitive hosts. These include camels, llamas, water buffalo, yaks, and species of pigs other than the domesticated *Sus scrofa*. Meat from many reptiles, birds,

and species of wild mammals that harbor sarcocysts is eaten in various parts of the world with unknown consequences. Therefore, there remain many potential but unknown sources of human intestinal sarcocystosis^[4].

The central portion of mature sarcocysts of *S. tenella* is devoid of septa and trophozoites but is filled with fluid. It contains a true animal toxin capable of rapidly killing rabbits when injected in small amounts. The chief symptom is a cholera-like diarrhea Guinea pigs, rats, and mice are nonsusceptible to it. The toxic agent gives some protein reactions and is heat labile and dialyzable^[3].

CONCLUSION

one third of sheep showed macrocysts and *Sarcocystis* is a meat transmitted parasite, so to prevent infection of food animals, they must be prevented from ingesting the sporocyst stage from human feces in contaminated water, feed, and bedding. When such preventative measures cannot be assured and meat might be harboring cysts, it should be thoroughly frozen for 2 days or more or thoroughly cooked to kill infectious bradyzoites. These measures will prevent the development of intestinal stages where humans might serve as definitive hosts.

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