

Prevalence of bovine *Cysticercosis* of Slaughtered Cattle in Meshkinshahr Abattoir

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Abstract: Problem statement: The occurrence of the larvae of *Taenia saginata* (*T. saginata*) in cattle musculature causes *T. saginata cysticercosis* or bovine *cysticercosis* while the adult worms in human small intestines cause taeniasis. **Approach:** In this study, the prevalence of *Taenia saginata cysticercosis* in cattle slaughtered for meat in Meshkinshahr Abattoir, Iran between September 2010 and August 2011 was reported. **Results:** The examination of various organs of 500 cattle in Meshkinshahr Abattoir showed that 15(3%) were infected with *T. saginata cysticercosis*. The tongue, masseter muscles, cardiac muscles, triceps muscles and thigh muscles were the main predilection sites of the cysts. The cysts of bovine *cysticercosis* were also identified on the spleen, intercostal muscles, diaphragm and liver. Out of 460 male cattle, examined, 14 (3%) had cysts of bovine *cysticercosis* while 1 (2.5%) of the 40 female animals investigated were infected. **Conclusion:** The animals slaughtered were all adults. No significant difference in prevalence rates was recorded between the sexes. The prevalence of bovine *cysticercosis* was higher in local sarabi cattle breeds than Holstein-Frisian cattle.

Key words: Prevalence, bovine *cysticercosis*, meshkinshahr abattoir

INTRODUCTION

The occurrence of the larvae of *Taenia saginata* (*T. saginata*) in cattle musculature causes *T. saginata cysticercosis* or bovine *cysticercosis* while the adult worms in human small intestines cause taeniasis (Solusby, 1982; Neva and Brown, 1994; Carpio, 2002). In humans, *T. saginata* infestation is accompanied with mild symptoms ranging from nausea, abdominal discomfort, epigastric pain, diarrhea, vitamin deficiency, excessive appetite or loss of appetite, weakness and loss of weight to digestive disturbances and intestinal blockage (Neva and Brown, 1994). However, in cattle, heavy infestation by *T. saginata cysticercosis* may cause myocarditis or heart failure (Gracey *et al.*, 1999). The life cycle and transmission of the parasite occur most commonly in environments characterized by poor sanitation, primitive livestock husbandry practices, and inadequate meat inspection, management and control policies (Smith and Corn, 2003; Phiri *et al.*, 2003). The life cycle of the parasite, *Taenia saginata*, involves humans and cattle the final and intermediate hosts respectively (Lees *et al.*, 2002). *T. saginata*

cysticercosis is found almost all over the world, albeit at very low prevalence in developed countries. Moderate prevalence levels are seen in southern Asia. High prevalence rates occur in Sub-Saharan Africa, especially in Eastern Africa where it causes an important economic loss due to condemnation of meat (Cabaret *et al.*, 2002). In Ethiopia, reported prevalence rates of bovine *cysticercosis* in cattle ranged from 2.2-3.2%. Bovine *cysticercosis* is one of those animal health problems that reduce export earnings of the country EARO (Edem, 2009). It is, therefore, important that due attention be given to this disease to improve the quality and quantity of beef so as to satisfy the domestic consumption and to increase the foreign export revenue. The aim of this study was to know the current prevalence of bovine *cysticercosis* in cattle using the conventional parasitological methods at Meshkinshahr Abattoir, North-west of Iran.

MATERIALS AND METHODS

Study area: The study was conducted in Meshkinshahr Abattoir, North-west of Iran. At Meshkinshahr Abattoir

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cattle, sheep, goats and camels are slaughtered and animals for slaughter come from different regions of the city.

Study animals: Postmortem inspection was conducted on 500 cattle slaughtered at Meshkinshahr Abattoir, which originate from neighboring localities and different regions. Of the animals slaughtered 125 were Holstein-Frisian cattle breeds culled due to various problems from dairy farms where as the remaining 375 were local sarabi cattle breeds. Particular attention was given to factors such as sex, age, and origin of the animals.

Postmortem inspection: Postmortem examinations were carried out in Meshkinshahr Abattoir on randomly selected 500 slaughtered cattle, between Septembers 2010 and August 2011. Carcasses of these animals were thoroughly inspected; incisions and inspection were done following the methods earlier described Ministry of Agriculture (Munyeme *et al.*, 2010; Belino, 1975). In the abattoir both exotic and local sarabi cattle breeds were slaughtered. The abattoir was visited three days in a week and was such that the butchers were met in the afternoon while bringing their animals to the abattoir for slaughter. This was done to determine the age and sex of each animal slaughtered. The diaphragm, triceps, thigh muscles, masseter muscle, heart muscle, intercostal muscles, lungs, liver, tongue, kidney, intestinal mucosa and spleen of 500 cattle slaughtered during the study period were examined for bovine *cysticercosis*. During the routine meat inspection of these organs one or more incisions were made. The cysts observed were categorized into live and calcified cysts. The cysts were carefully dissected from the tissues and the number in each organ recorded for each animal. At the end of the examination, the cysts collected were taken to the laboratory for further diagnosis following the procedures already reported (Opara *et al.*, 2006). The cysts were released using bovine bile or pepsin, usually occurred within 30-60 min. The cysts were then identified as *T. saginata cysticercosis* if there were no hooks on the evaginated scolex (Munyeme *et al.*, 2010; Opara *et al.*, 2006).

Statistical analysis: The occurrence of bovine *cysticercosis* was calculated by dividing the number of animals harboring a cyst by the total number of animals examined. Percentages (%) to measure occurrence and chi-square (χ^2) to measure association were the statistical tools applied.

RESULTS

All the cattle slaughtered in the Meshkinshahr Abattoir were adults. Of the total 500 animals inspected,

15 animals were positive for bovine *cysticercosis*. The prevalence of bovine *cysticercosis* was 3%. The prevalence between Holstein-Frisian cattle breeds and local sarabi cattle breeds were described (Table 1). The sex distribution of *T. saginata cysticercosis* infection of cattle was described (Table 2). Of the 500 cattle examined, 92% were adult males. Although more males than females were examined, the prevalence of infection did not show any significant difference ($p>0.05$). On the predilection sites of the cysts 36.6, 35.6, 34.9 and 33.4%, of the cysts were collected from the masseter muscles, tongue, heart muscles and triceps muscles respectively. Infection was also recorded from the liver (2.7%), intercostal muscles (1.4%), spleen (0.9%) and intestinal mucosa (0.1%). Bovine *cysticercosis* was not found in the lungs and kidney (Table 3). The distribution and condition of bovine *cysticercosis* in slaughtered cattle in Meshkinshahr Abattoir, North-west of Iran was described (Table 4). The cysts of bovine *cysticercosis* found in the spleen, intercostal muscles and intestinal mucosa were all live while those in the liver 4 were live and 19 were dead. Both live and dead cysts of bovine *cysticercosis* were found also in other organs inspected.

Table 1: The prevalence of *T. saginata cysticercosis* infection of cattle in Meshkinshahr Abattoir

Cattle breed	No. examined	No. (%) infected
Local sarabi cattle	375	13(3.4)
Holstein-Frisian cattle	125	2(1.6)
Total	500	15(3)

Table 2: Sex distribution of bovine *cysticercosis* infection of cattle in Meshkinshahr Abattoir

Sex	No. examined	No. (%) infected
Male	460	14(3)
Female	40	1(2.5)
Total	500	15(3)

$p>0.05$

Table 3: Predilection sites of bovine *cysticercosis* cysts in slaughtered cattle in Meshkinshahr Abattoir

Predilection sites	No (%) infected
Masseter muscles	102(36.6)
Tongue	92(35.6)
Heart muscles	83(34.9)
Triceps	79(33.4)
Thigh muscles	61(11.9)
Diaphragm	54(11.2)
Liver	23(2.7)
Intercostals muscles	12(1.4)
Spleen	8(0.9)
Intestinal mucosa	1(0.1)

Table 4: Distribution and condition of the cysts of bovine *cysticercosis* in 15 infected slaughtered cattle in Meshkinshahr Abattoir

Live cyst		Calcified cyst		Live and calcified cyst	
No. cyst/animal	No. animals	No. cyst/animal	No. animals	No. cyst/animal	No. animals
1-5	3	1-5	0	1-5	1
6-10	3	6-10	1	6-10	0
11-15	2	11-15	1	11-15	0
16-20	2	16-20	0	16-20	0
21-25	1	21-25	0	21-25	0
Above 25	1	Above 25	0	Above 25	0
Total	12	Total	2	Total	1

DISCUSSION

During the present study period, we found that 3% of cattle presented for slaughter at Meshkinshahr Abattoir, North-west of Iran harbored bovine *cysticercosis*. Cysticerci are easily missed, as they may not be present on routine cuts considering that most cases of *cysticercosis* are light infections. Moreover, observations indicated that except for the dead, degenerate or calcified cysticerci that usually form white and fibrotic lesions a careless meat inspector could most likely miss out quite a number of viable cysticerci, which blend the pinkish-red colour of the meat and be passed on for human consumption. Differences in the skills and motivation of meat inspectors, the speed of the slaughter activity, and the meat inspection facilities, are among the many other contributory factors. Our observations showed that the masseter muscles, tongue, heart muscles, triceps muscles and thigh muscles among others were the preferred organs (predilection sites) for the cysts of bovine *cysticercosis* similar to earlier reports in various endemic areas (Zahedi, 2009; Munyeme *et al.*, 2010; Pawlowski and Schultz, 1972; Opara *et al.*, 2006) DOA. It appears that several factors, such as activity of the muscles, age, and the geographical area concerned determine largely the predilection sites in slaughtered cattle (Minozzo *et al.*, 2002; Opara *et al.*, 2006; Opara *et al.* 2006). It was observed that some live cysts were isolated from the intercostal muscles, spleen, liver, intestinal mucosa but not from the kidneys and lungs. Sex-related distribution of bovine *cysticercosis* infection of the slaughtered cattle in this study showed that sex of the animals and infection were independent. Though more males than females were infected, it could be related to the sample size and not sex. Since the animals slaughtered were all adults it was not possible to compare the relationship of prevalence with the ages of the animals. Breed related distribution of bovine *cysticercosis* indicated higher prevalence (3.4%) in local sarabi cattle breeds than Holstein-Frisian cattle (1.6%). This is may be associated with management system where Holstein-Frisian cattle breeds were from

dairy farms having less exposure to contaminated pasture with human excreta while the local sarabi cattle breeds were from fattening or extensive management system. In Meshkinshahr, the habit of eating raw beef dishes and backyard slaughter might have contributed for the high prevalence of bovine *cysticercosis* in cattle. Therefore, to reduce the transmission of taeniasis/ bovine *cysticercosis*, public education to avoid consumption of raw meat, and use of latrines and improved standards of human hygiene were recommended.

CONCLUSION

The animals slaughtered were all adults. No significant difference in prevalence rates was recorded between the sexes. The prevalence of bovine *cysticercosis* was higher in local sarabi cattle breeds than Holstein-Frisian cattle.

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