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Research Article

Prevalence of cysticercus of *Taenia saginata* in cattle slaughtered

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ABSTRACT

Background: *Taenia saginata* is a parasite infecting cattle. Human and cattle are as definitive hosts and intermediate hosts, respectively. Humans infected by eating raw or undercooked beef containing larval cysts. The aim of this study was to determine the prevalence rate of *T. saginata* in cattle in the slaughterhouse of Bistoons Kermanshah (Iran) in 2010-2011.
Methods: In order to determine the infection in cattle slaughtered, 100,040 carcasses were observed and inspected along 24 months, from January 2010 until December 2011. Organs like heart, masseter muscles, tongue, triceps muscles, diaphragm, thigh, back ribs, kidney and liver were cut and inspected by eye-and-knife method.
Results: In 2010, 29 cases (0.06%) from 48171 and in 2011, 20 cases (0.03%) from 51869 of carcasses were infected. According to the result of this study, the most contaminated organs were heart and tongue.
Conclusion: Eye-and-knife method was also less sensitive than standard method (the method used in South Africa, Germany and England) for diagnosis of *T. saginata* in carcasses.

Keywords: *Taenia saginata*, cattle slaughtered, Iran.

INTRODUCTION

Bovine cysticercosis is a muscular infection of cattle by the larvae of the human intestinalcestode, *Taenia saginata*. *T. saginata* known as beef tapeworm because beef is the main source of infection and it has a cosmopolitan distribution and it causes anorexia, loss of weight, abdominal pain and digestive upset.[1] *T. saginata* has two different stages in the life cycle, in intermediate host (cattle) and final host (human). Larval stage (*Cysticercus bovis*) occurs in heart and skeletal muscles of intermediate host and adult worm locates in intestine of final host. Cattle are infected after eating of water or feed containing the eggs expelled by the human faeces. Cysticercosis in cattle often has no clinical features, but, heavy infection may cause myocarditis. Human infection by consuming of infected raw or semi-cooked beef.[2] The infection is a problem in developed countries where considerable rare (i.e. undercooked) beefsteak is consumed and wider in developing countries where hygienic conditions are poor and where the inhabitants traditionally eat raw or insufficiently cooked. It is important to note that eggs have been demonstrated to survive almost all stages of sewage treatment.[3] The zoonotic spread of the *T. saginata* is mainly based on the social, economical and cultural conditions of some population in certain regions of the world.[4,5] The frequency of cattle cysticercosis in Africa, Canada, and various regions of Brazil vary between 18.49%, 2.2% and 5.1% respectively. In Europe, the incidence is smaller and varies from 0.007% to 2.4%.[5-11] Also highly endemic in Latin America, Africa and Asia where poverty conditions such as poor sanitation, and intimate contact between humans and their livestock are common.[12] The costs of treatment for *T. saginata* are high for the producers and slaughterhouses, and their presence may present an obstacle for the exportation of meat.[5,13] It has a distribution throughout of the Iran, especially in rural areas.[14] Some studies had previously been conducted in the country about cysticercosis in cattle.[15-17] Moderate to

high prevalence of this parasite has previously been observed in cattle in Kermanshah Province, Iran.[2] The aim of this study is determine the prevalence rate of *T. saginata* in cattle in the slaughterhouse of Bistoons Kermanshah (Iran) in 2010 and 2011.

METHODS

This descriptive–analytic was carried out on all of the cattle slaughtered along 24 months, from January 2010 until December 2011. A total of 100,040 carcasses in the slaughterhouse of Bistoons Kermanshah (Iran) in 2010 and 2011 have been selected randomly for this study. From 100,040 carcasses 75,030 were males and 25,010 were females with age from 10 months to 18 months. Meat inspection relies exclusively on visual examination of the intact and cut surfaces of the carcass (eye-and-knife method) in the slaughterhouse by meat inspectors who follow officially laid-down procedures. Cysticercus bovis was seen like a small, white and also a turbid capsule with a grown scolex or was seen like a red capsule with a slight grown and calcic scolex in the organs. Generalized infection according to FAO regulations means 2 or 3 cysts found on each cut into the muscles. Heavily infected carcasses were condemned and those with light infection were sent for treatment by freezing and holding for approximately 10 days at −10°C or for use in meat industry.[17-19]

RESULTS

The present study was carried out on 100,040 carcasses according to eyeand-knife method. The prevalence of *T. saginata* in 2010 and 2011 reported respectively 0.06% (29 cases) and 0.03% (20 cases). The most contaminated cases to *T. saginata* were seen in January, September and December (Table 1). The most contaminated organs were heart with 24 cases (49%), tongue with 18 cases (37%) and thigh with 4 cases (8%), respectively (Table 2). Comparison between the results of the amount of contamination to *T. saginata* in 4 western provinces of Iran including Kurdistan, Hamadan, Ilam, and Luristan with the results of this study that was done in Kermanshah, showed that the most amount of contamination in 2010 was related to Kermanshah and Luristan and in 2011, Kermanshah, Luristan, and Kurdistan with 3% of contamination had the most amount of contamination than Ilam, and Hamadan (Figure 1).

Table 1: The amount of contamination of cattle slaughtered to *T. saginata* in the slaughterhouse of Bistoons Kermanshah (Iran) according to month in 2010 and 2011.

Year	2010		2011	
Month	**Cattle slaughtered (N)***	***T.saginata* (N)***	**Cattle slaughtered (N)***	***T.saginata* (N)***
Jan	3084	5	3263	4
Feb	4023	1	3834	2
Mar	4053	1	4195	1
Apr	4084	2	4128	0
May	4477	1	4666	1
Jun	4596	1	4615	0
Jul	4361	0	4340	2
Aug	3728	2	4110	0
Sep	3951	8	4333	4
Oct	3698	1	3653	1
Nov	3479	2	4924	1
Dec	4637	5	5808	4
Total	48171	29	51869	20

***** Number of cattle slaughtered and number of *T. saginata*

Table 2. Anatomical distribution *T. saginata* among inspected organs in the slaughterhouse of Bistoons Kermanshah (Iran) in 2010 and 2011.

Anatomic sections	Number of *T. saginata*	Percentage of total (%)
Heart	24	49
Tongue	18	37
Liver	0	0
Masseter muscles	1	2
Triceps muscles	1	2
Diaphragm	0	0
Thigh	4	8
Back ribs	1	2
Kidney	0	0
Total	49	100

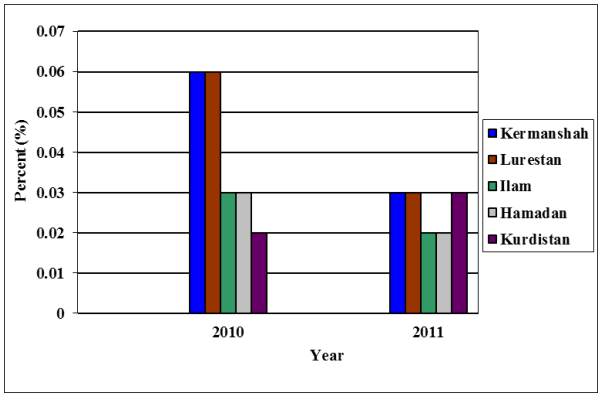

Figure 1: The prevalence of *T. saginata* according to percentage in 5 western provinces of Iran (2010-2011).

DISCUSSION

Cysticercus bovis is a capsule full of liquid with one scolex, its size is 5×10 mm. The tapeworm develops in the small intestine and becomes sexually mature in about 3 month, producing gravid proglottids, which are mobile and either migrate from the host's anus spontaneously or are shed in faeces.[6] Humans become infected with the adult tapeworm by eating raw or rare beef containing bladder worms. Most of the countries have different regulations

regarding the inspection of carcasses, which usually attempts to reconcile the interests of owners and those of the consumers.[20] In meat inspection of contaminated cattle to *T. saginata* only 80% to 90% of cysticercus could be recognized[9,21] following eye-and-knife method, found a *T. saginata* prevalence of 38.8%. Eslami *et al*. in their research by the use of the eye-and-knife method that was done in Khorram-Abad (Iran, 2003) found out that 2.6% of carcasses were contaminated to *T. saginata*, while in the selective method (the suggested method in South Africa, Germany and England that in this method, the place and also the number of cut are different from the traditional method) 7.6% of carcasses were contaminated.[15] In this study based on eye-and-knife method the amount of contamination of the carcasses to *T. saginata*, in 2010 and 2011 was 0.06% and 0.03%, respectively. According to these subject matters, it could be said that, in spite of the fact that eye-and-knife method is the most practical method for parasitized site, but it is not the accurate one and it cannot detect all of the carcasses infected with cysticerci.[15] In this study as the other studies [2,5] predominant sites of *T. saginata* was in heart, the main causes of this state may be attributed to involvement of this muscle with blood's circulation and the different management practices of the animals in such areas like using the cattle in the daily agricultural activities which in turn influence the distribution of the cysticerci in different organs.[2,22] In different countries and even different regions regarding the organs that should pay more attention to during the inspection. Urbina *et al*. (1976) found that masseter muscles, with 28% contamination were the most important muscle from the point of view of contamination to *T. saginata*.[23] The prevalence of *T. saginata* is different in studies that were done in Iran, as the results of 5 western provinces and its comparison with together, indicates that, factors like poor hygiene, poverty, increased human cattle contact such as during drought years and nutrition in one side and custody of slaughtered cattle, the condition of slaughterhouses from the point of view of geographical zone and accuracy of inspectors for inspecting the carcass in another side, can overshadow the prevalence of *T. saginata* in each region. It should be noted that, in this study the most infected cases were in January, September and December which expresses that as regard to the prevalence of infection in different seasons, there should be more study for determine the seasonal prevalence of the infection. Regarding these cases, all of the changes express the inexistence of the accuracy of the eye-and-knife method, so the accuracy of this method should extend to its maxi mum by doing some necessary studies.[15]

CONCLUSION

According to these results, as regard to the fact that the only practical way for diagnosing *T. saginata* is inspecting the meat with eye-and-knife method, and regarding the deficiencies of this method it would be recommended to equalize the accuracy of inspecting the slaughterhouses with routine standards (the standards that legislated by the slaughterhouse and it could be different in each country), that this matter needs the excessive accuracy of inspectors while inspecting the carcass.

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