International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

# Detection of *Cysticercusbovis* and Age, Sex Relationat Post-Mortem Inspection in Baghdad

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**Abstract:** ***Cysticercus bovis is one of the zoonotic diseases that threaten food safeness and food security. It is an infection of cattle generated by the larval stage of the human tapeworm Taenia saginata. Humans are the definite host and bovines the intermediary host to this disease. A total of 50 cattle were randomly sampled and regularly inspected for the presence of Cysticercus bovis in edible parts of the slaughtered cows in Baghdad slaughter houses. Sixteen of the 50 meat carcasses inspected at postmortem find to be infected with the parasite (32%). The shoulder, tongue, masseter, heart and liver harbored at least one cyst. Masseter muscles were the most regularly infected (30%), followed all the shoulder (26%) then heart (20%), tongue (14%) and liver (10%). The estimate number of cysts found in a given organ or muscle ranged from one to four, the highest number was registered in the masseter 15 cysts and shoulder muscle 13 cysts, Fallowed by heart 10 cyst, tongue 7 cysts and liver 5 cysts. there is significant variation was observed between different ages of cattle (p>0.05), The infestation rate was more advanced in adult cows than young cows, where the supreme prevalence (24%) was detected in eldest cows 5 years and above while The infestation rate was lowest in carcasses of cows younger than 5 years (8%). On the other hand, the infestation rate was more advanced (P≥0.05) in female 18% than male carcasses (14%).***

**Keywords:** Detection, cow, *Cysticercus bovis*, age, sex

## 1. Introduction

Foods of animal origin are usually the preferred source of protein. However, if not fitly prepared or handled, they can generate food-borne infections. Cysticercosis caused by *Taenia saginata* is among the diseases that affect food safety (Karshima *et al.*, 2013; Gajadhar *et al.*, 2006). It is fit in the zoonotic diseases that threaten food safety and food security. It is an infection of cattle caused by the larval stage of *Taenia saginata*. Humans are the definite host and bovines the intermediary host to this infection. Human taeniosis, or infection with the adult *T. saginata*, is characterized by the presence of up to 30meterlong worm in the small intestine of the infected human (Garedaghi *et al.*, 2011; Gracey et al., 1999), who may pass millions of eggs daily, These eggs can survive up to 7 months in the appropriate ecosystem and can be transmitted to the intermediary host (Rommel et al., 2000). This parasite is always distributed in developing as well as in developed countries. (Dorny et al., 2009; Gracey and Collins, 1992; Cabaret et al., 2002).The prevalence is considered to be more advanced in developing nations because of poor hygienic, traditional cow's providence systems and inadequate meat inspection facilities (Cabaret et al., 2002; Dorny & Praet 2007). For this, the quality of human life, the manufacturing of meat and offal are compromised (Alum, Rubino & Ijaz 2010; Dorny & Praet 2007; Gajadhar *et al.*, 2006). As per an estimate, 50 million cases of such infestation occur globally with 50, 000 people dying from this problem each year (WHO, 1996). Estimates planted on computations from incidence demonstrate that 2% of the individual population in Europe is infested with *Taenia saginata* (SCVPH, 2003). In humans, the disease is termed as taeniasis which is accompanied with symptoms like vomiting, intestinal distress, epigastricpain, diarrhea, excessive appetite or loss of appetite, weakness, loss of weight and intestinal obstacle (Ofukwu et al., 2009; Neva and Brown., 1994).Sometimes, the mobile gravid segments may make their way to uncommon sites like the appendix and biliary tract and may generate dangerous disorders. Live cattle having *C. bovis* shows no symptoms, however, heavy infestation by the larvae may generate myocarditis or heart failure (Gracey and Collins., 1992). Cysticerci last alive in cows from weeks to years and such infection in cows is a public health issue as the infected raw or undercooked beef generate taeniasis in human. It has economic influence as well as the economic losses accruing as a result of condemnation, chilling, downgrading of infected carcasses, disease prevalence, prices of cattle and treatment costs for detained carcasses (Giesecke., 1997) .

*Cysticercusbovis* and taeniasis are common where hygienic conditions are poor and the inhabitants traditionally eat raw or inadequately cooked or sun-cured meat (Minozzo *et al.*, 2002). Inadequate health teaching and low availability of taenicides are the principal obstacles for the control of such infections (Pawlowski., 1996). Due to these reasons, taeniasisis more frequent in developing nations including Iraq where meat is a necessary ingredient of human diet. It is, therefore, important that sufficient attention be given to this problem so that quality and quantity of beef may satisfy the domestic requirements, increase the foreign export revenue and improve the public health.

The current review is designed to focus present condition of *Cysticercusbovis* at post-mortem in Baghdad, to know if a relation exists between age, sex and prevalence of infestation by *C. bovis.*

## 2. Material and Methods

This survey was accomplished on cows slaughtered at different slaughterhouses in Baghdad province by following a systematic random sampling approach. A total of 50 cattle were randomly sampled and typically checked for the existence of *C. bovis* in edible parts of the

slaughtered cattle. Appropriate documentary form was accomplished for each inspect sample with animal-related information inclusive of its age and sex and the sites and estimate number of cysts.

Ante-mortem and post-mortem examinations were conducted by visiting the slaughterhouses three days a week. For the ante-mortem inspection cattle were randomly chosen. Sex, age and origin were reported. Age assessment was done depended on owner information and dentition. For the post-mortem examination the heart, liver, lung, tongue, masseter muscle, shoulder muscle, neck muscle, intercostal muscle and diaphragm were inspected for the existence of cysticerci.

During the first stage, visualization and palpation of organs, muscles and carcass were perform. During the second stage, farther incisions were done in each case where one or more cysticerci were found (Gracey, et al., 1999).Anatomical distribution of the cysts by organ or muscle impressed and their condition as active (fluid-filled) or calcified were determined, as described by Gracey et al. (1999).

The data were analysed applying the statistical package SPSS were used to summarize the data collected. The prevalence rate of *Cysticercusbovis* was established as the number of cows found positive for at least one cyst (active or calcified) at the time of meat inspection × 100 divided by the all number of cattle examined.

## 3. Results and Discussion

As shown in Table 1, the abattoir survey showed that 32% of the cattle tested were positive for the existence of at least one cyst in the organs or muscles inspected. Among the 16 cattle harbouring bovine cysticercosis (see Table 1), 10 cattle had at least one cyst in a single organ or muscle while the remaining 6 had cysticerci in more than one organ or muscle. No cysts were found in the neck muscle, intercostal muscle and diaphragm.

**Table 1:** Prevalence of *Cysticercusbovis*cysts in cattle slaughtered in different slaughterhouses in Baghdad

| Organ or muscle affected | Number of cattle affected | prevalence rate % |
|---|---|---|
| Shoulder | 2 | 4% |
| Tongue | 3 | 6% |
| Masseter | 3 | 6% |
| Heart | 2 | 4% |
| Liver, shoulder and heart | 3 | 6% |
| Shoulder and masseter | 3 | 6% |
| Total | 16 | 32% |

n=50

The shoulder, tongue, masseter, heart and liver harboured at least one cyst. Masseter muscles were the most common infected (30%), followed by the shoulder (26%) then heart (20%), tongue (14%) and liver (10%) (see Table 2). The count of cysts appearing in a given organ or muscle ranged from one to four the supreme number was reported in the masseter 15 cyst and shoulder muscle 13 cyst Fallowed by heart 10 cyst, tongue 7 cysts and liver 5 cysts (see Table 2).

**Table 2:** Distribution of *Cysticercusbovis*cysts in edible parts of infected cattle:

| Edible parts | Number affected | Mean per organ | Range | Total | % organ affected |
|---|---|---|---|---|---|
| shoulder | 5 | 2.6 | 1-4 | 13 | 26 |
| Tongue | 3 | 2.3 | 1-4 | 7 | 14 |
| Masseter | 6 | 2.5 | 2-4 | 15 | 30 |
| Heart | 5 | 2 | 1-3 | 10 | 20 |
| Liver | 3 | 1.6 | 1-2 | 5 | 10 |
| Total | 22 | 2.2 | 1-4 | 50 | 100 |

There is significant variation was observed ($p$> 0.05) in the Occurrence rate between different age groups of animals or between male and female see (Table 3) (Table 4).

**Table 3:** Occurrence of *Cysticercusbovis*cysts with regard to age:

| Category | Total number of carcasses | Number positive | Occurrence (%) |
|---|---|---|---|
| ≤ 5 years | 20 | 4 | 8% a |
| ≥ 5 years | 30 | 12 | 24%b |
| Total | 50 | 16 | 32% |

**Table 4:** Occurrence of *Cysticercusbovis*cysts with regard to sex:

| Category | Total number of carcasses | Number positive | Occurrence (%) |
|---|---|---|---|
| Female | 19 | 9 | 18% a |
| Male | 31 | 7 | 14% b |
| Total | 50 | 16 | 32% |

Meat inspection revealed that the prevalence of *C.Bovis* in the Baghdad was about 32%. This is higher than previously documented for Turkey, the prevalence detected at a regional level ranged from 0.3 to 30 % enclosed by 1957 and 1990 (Kus *et al* ., 2014). In Eastern Germany and in the province of Olsztyn in Poland prevalence's of 3.5–6.8 % and 3.6 %, respectively, were recorded during 1974–1989 (Mobius., 1993; Uradzinski and Radkowski., 1992). After 1990, the supreme prevalence levels were described in one abattoir of Germany 6.5 % in 1992 (Ring, 1992) and in the Madeira (2.0–5.8 %) during 1993–2005 (Afonso., 2008) and in Kombolcha in north-eastern Ethiopia (6.7%) (Endris & Negussie 2011), Jimma in south-western Ethiopia (2.9% and 4.4%) (Megersa *et al.* 2010; Tolosa *et al.* 2009).The minimum prevalence was identified for Estonia, which recorded no positive cases for 2006, 2008, 2009 and 2010 (The Community Summary Report on Trends and Sources of Zoonoses., 2010) followed by Sweden and the UK with a range of $2*10^{-4}$-$1*10^{-3}$ and $8*10^{-3}$-$4*10^{-2}$%, respectively (The European Union Summary Report on Trends and Sources of Zoonoses 2014, 2015). In the remaining countries, the prevalence was under 2.0 % with few exceptions (i.e. Italy and The Netherlands). In most of the cases it was below 1.0 %, the high difference between and within countries in prevalence rate of *C.Bovis* may be

affected with the number of cows inspected, the sensitivity of the meat inspection procedures which perhaps affected by the site and method of incision, abattoir facilities and management, the motivation and competency of the meat inspectors and the readiness of the owner to cooperate (Abunna *et al.* 2008; Dorny & Praet 2007; Wanzala *et al.* 2003).The environmental and personal hygienics, stock raising practices, proximity to waste and accessibility of taenicides for treating animals might also lead to differences in prevalence (Cabaret et al. 2002; Dorny & Praet 2007; Kumar & Tadesse 2011; Wanzala *et al.* 2003).To obtain the excellent evaluation of the prevalence of *C.Bovis* and elevated confidence in the results of this survey, the multiple incisions could be made during inspection, they also performed a detailed examination of all muscles and organs.

The PM inspection identified that in association with the edible parts investigated the liver, shoulder, tongue, heart and masseter muscle obligate vigilant inspection to diagnose the cyst. Shoulder and masseter muscles (Abunna *et al.* 2008), shoulder, heart and tongue (Megersa *et al.* 2010), and heart, masseter, tongue, and thigh muscles (Kebede 2008) previously have been termed as principal sites to be inspected.

There is a relationship between prevalence of *C. bovis* with the ages of the animals, few sources provided the age of the animals inspected. Only in a few times prevalence was given for different groups of age. Results showed more advanced rates for adult animals than for calves. In a Croatian stockyard at the time 2005–2010 the prevalence detected in calves (0.014 %) was less than in steers (0.093 %) and much less than in cows (0.69 %) (Zdolec et al., 2012). In the UK, at the time 2008–2011 the prevalence detected in calves and adults was 0.008 and 0.032 %, respectively (Hill et al ., 2014) These results are in accompany with the epidemiological situation detected in Belgium where positive cattle are commonly adult cattle and calves are generally negative at meat inspection (Dorny et al., 2000).The reason for this relation of prevalence with the ages of the animals could be explained by the life cycle of *C. bovis* that may take time to be found in young animals due to they met with few or non-infected individual excretions at their early age. (Karshima et al., 2013)

Of the 50 carcasses inspected31were from males and 19 from females. Although more males than females were inspected, the manifestation of disease was more in female than male carcasses. This survey showed that out of 16 infected cattle, 9 (18%) were females and males were only 7 (14%) With regard to the incident of *C. bovis* in association with sex, 18% (9/50) of females inspected were found positive whilst the occurrence in males was 14% (7/50). Statistical analysis showed that the disease is associated with sex ($p<0.05$).The occurrence rate was more in the females than males. The reason of this difference could be that cows are stressed during oestrus cycle which causes hormonal imbalances and suckling of calves and that weakens the immune system so lead to easy infection. The other likely reason is because cows are kept longer for breeding and milking while the bulls and steers are sold off at an early age. (Yohana et al., 2013).

## Reference

[1] Abunna, F., Tilahun, G., Megersa, B., Regassa, A. &Kumsa, B., 2008, 'Bovine cysticercosis in cattle slaughtered at Awassa municipal abattoir, Ethiopia: Prevalence, cyst viability, distribution and its public health implication', Zoonoses and Public Health 55, 82–88. http://dx.doi.org/10.1111/j.1863-2378.2007.01091.x
[2] Afonso M. Prevalência de Taeniasaginata/CysticercusbovisnaRegiãoAutónoma da Madeira. UniversidadeTécnica de Lisboa, Faculdade de MedicinaVeterinária; 2008
[3] Alum, A., Rubino, J.R. &Ijaz, M.K., 2010, 'The global war against intestinal parasites – Should we use a holistic approach?', International Journal of Infectious Diseases 14, 732–738. http://dx.doi.org/10.1016/j.ijid.2009.11.036
[4] BieringSoerensen, U., 1977: Meat inspection and detection of Cysticercusbovis. I. Ultraviolet light as an aid to diagnosis. Dansk Veterinaertidsskrift 60 (21): 931-935
[5] Cabaret, J., Geerts, S., Madeline, M., Ballandonne, C. &Barbier, D., 2002, 'The use of urban sewage sludge on pastures: The cysticercosis threat', Veterinary Research 33, 575–597.
[6] Dorny P, Vercammen F, Brandt J, Vansteenkiste W, Berkvens D, Geerts S. Sero-epidemiological study of Taeniasaginata cysticercosis in Belgian cattle. Vet Parasitol. 2000; 88:43–9.View ArticlePubMedGoogle Scholar
[7] Dorny, P. &Praet, N., 2007, 'Taenia saginata in Europe', Veterinary Parasitology 149, 22–24. http://dx.doi.org/10.1016/j.vetpar.2007.07.004
[8] Dorny, P. &Praet, N., 2007, 'Taenia saginata in Europe', Veterinary Parasitology 149, 22–24. http://dx.doi.org/10.1016/j.vetpar.2007.07.004
[9] Dorny, P., Praet, N., Deckers, N. & Gabriel, S., 2009, 'Emerging food-borne parasites', Veterinary Parasitology 163, 196–206. http://dx.doi.org/10.1016/j.vetpar.2009.05.026.
[10] Endris, J. &Negussie, H., 2011, 'Bovine cysticercosis: Prevalence, cyst viability and distribution in cattle slaughtered at KombolchaElfora Meat Factory, Ethiopia', *American-Eurasian Journal of Agriculture and Environmental Science* 11, 173–176.
[11] Gajadhar, A.A., Scandrett, W.B. & Forbes, L.B., 2006, 'Overview of food- and water-borne zoonotic parasites at the farm level', Revue scientifiqueet technique de l'Office international des Épizooties 25, 595–606.
[12] Garedaghi Y, Rezaii Saber AP and Saberie M (2011).Prevalence of bovine Cysticercosis of Slaughtered Cattle in Meshkinshahr Abattoir. Am. J. Anim. Vet. Sci., 6 (3): 121-124.
[13] Giesecke, W.H., 1997. Prevalence and economic implications of taeniasis/cysticercosis in South Africa. In: Cysticercosis. Report on a Workshop held at the Onderstepoort Veterinary Institute, Onderstepoort, South Africa, August 18–19, pp. 19–70

[14] Gracey J, Collins DS, Huey R (1999) Diseases caused by helminthand arthropod parasites. In: Meat hygiene, 10th edn. WB Saunders, UK, pp 635–699.
[15] Gracey, F.J. and Collins, S.D., 1992. Meat Hygiene. 5th edition, BaillièreTindall, 24–28 Oval Road, London NW17DX: pp. 413–420.
[16] Gracey, F.J. and Collins, S.D., 1992. Meat Hygiene. 5th edition, BaillièreTindall, 24–28 Oval Road, London NW17DX: pp. 413–420
[17] Gracey, J.F., Collins, D.S. & Huey, R.J., 1999, Meat hygiene, 3rd edition, W.B. Saunders, Philadelphia.pp. 669–678.
[18] Hill AA, Horigan V, Clarke KA, Dewe TCM, Staerk KDC, O'Brien S, Buncic S. A qualitative risk assessment for visual-only post-mortem meat inspection of cattle, sheep, goats and farmed/wild deer. Food Control. 2014; 38:96–103.
[19] Karshima NS, Pam VA, Bobbo AA, Obalisa A (2013). Occurrence of Cysticercusbovis in Cattle Slaughtered at the Ibi Slaughter House, Ibi Local Government Area of Taraba State, Nigeria. J. Vet. Adv., 3 (3): 130-134.
[20] Kebede, N., 2008, 'Cysticercosis of slaughtered cattle in northwestern Ethiopia', Research in Veterinary Science 85, 522–526. http://dx.doi.org/10.1016/j.rvsc.2008.01.009
[21] Kumar, A. &Tadesse, G., 2011, 'Bovine cysticercosis in Ethiopia: A review', Ethiopian Veterinary Journal 15, 15–35. http://dx.doi.org/10.4314/evj.v15i1.67681
[22] Kus FS, Sevimli FK, Miman O. Cysticercusbovis in Turkey and its importance from the public health aspect. TurkiyeParazitolDerg. 2014; 38:41–7.
[23] Medicine, Impacts onHuman Health and Nutrition in Africa. In: Proceedings of an International Conference, Lindberg, 50- 71
[24] Megersa, B., Tesfaye, E., Regassa, A., Abebe, R. &Abunna, F., 2010, 'Bovine cysticercosis in cattle slaughtered at Jimma Municipal Abattoir, South Western Ethiopia: Prevalence, cyst viability and its socio-economic importance', Veterinary World 3, 257–262. http://dx.doi.org/10.5455/vetworld.2010.257-262
[25] Minozzo, J.C., Gusso, R.L.F., De Castro, E.A., Lago, O. and Soccoi, V.T., 2002. Experimental Bovine Infection with T. saginata Eggs: Recovery Rates and Cysticerci Location. Braz. arch. biol. technol. 45, 4.
[26] Mobius G. Epidemiologic studies of C. bovis and T. saginata infections in eastern and western Germany. DtschTierarztlWochenschr. 1993; 100:110–4.
[27] Neva, A.F. and Brown, W.H., 1994. Basic Clinical Parasitology. 6th edition. Prentice -Hall International Inc., pp. 181–200
[28] Ofukwu RA, Akwuobu CA, Okwori (2009). Epidemiology and public health importance of bovine cysticercosis in Makurdi, North Central Nigeria. Tanzania Vet. J., 26:37-42.
[29] Pawlowski, Z. S., 1996. Helmenthic Zoonosis Affecting Humans in Africa. Vet.Pawlowski Z S 1996 Helminthic zoonoses affecting humans in Africa. InLindberg R (ed.), Veterinary medicine: impacts on human health andnutritionin Afirca. SLU/Repro, Uppsala, Sweden: 41–50
[30] Ring C. Environmental and food hygiene aspects of cestode infections of humans. Germany: DtschTierarztlWochenschr; 1992; 295–7.
[31] Rommel M, Eckert J, Kutzer E, Körting W, Schnieder T (2000) Taeniasaginata-Zystizerkose. In: VeterinärmedizinischeParasitologie. BareyBuchverlag, Berlin, Germany, pp 218–221
[32] SCVPH (Scientific Committee on Veterinary Measures relating to Public Health) (2003) Opinion on revision of meat inspection in veal calves, adopted on 14-15 April. (http://europa.eu.int/comm/food/fs/sc/scv/out65_en.pdf).
[33] The Community Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in the European Union in 2008. EFSA Journal. 2010; 8 (1):1496.
[34] The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2012. EFSA Journal. 2014; 12 (2):3547-312. doi: 10.2903/j.efsa.2014.3547.
[35] The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2013. EFSA Journal. 2015; 13 (1):3991-162. doi:10.2903/j.efsa.2015.3991.
[36] Tolosa, T., Tigre, W., Teka, G. &Dorny, P., 2009, 'Prevalence of bovine cysticercosis and hydatidosis in Jimma municipal abattoir, South West Ethiopia', *Onderstepoort Journal of Veterinary Research* 76, 323–326. http://dx.doi.org/10.4102/ojvr.v76i3.37
[37] Uradzinski J, Radkowski M. The occurrence of parasitic invasions in slaughter animals in the Olsztyn province in years 1980–1991. Med Weter. 1992; 48:564–6.
[38] Wanzala, W., Onyango-Abuje, J.A., Kang'ethe, E.K., Zessin, K.H., Kyule, N.M., Baumann, M.P. et al. 2003, 'Control of Taenia saginata by post-mortem examination of carcasses', African Health Science 3, 68–76.
[39] World Health Organization (WHO), 1996. Investing in health research and development Report of the committee on health research relating to future intervention options.Geneva, Switzerland: WHO (World Health Organization), pp 278
[40] Yohana C, Mwita CJ, Nkwengulila G (2013). The Prevalence of Porcine Cysticercosis and Risk Factors for Taeniasis in Iringa Rural District. Int. J. Anim. Vet. Adv., 5 (6): 251-255.
[41] Zdolec N, Vujevic I, Dobranic V, Juras M, Grgurevic N, Ardalic D, Njari B. Prevalence of Cysticercusbovis in slaughtered cattle determined by traditional meat inspection in Croatian abattoir from 2005 to 2010. Helminthologia. 2012; 49:229–32