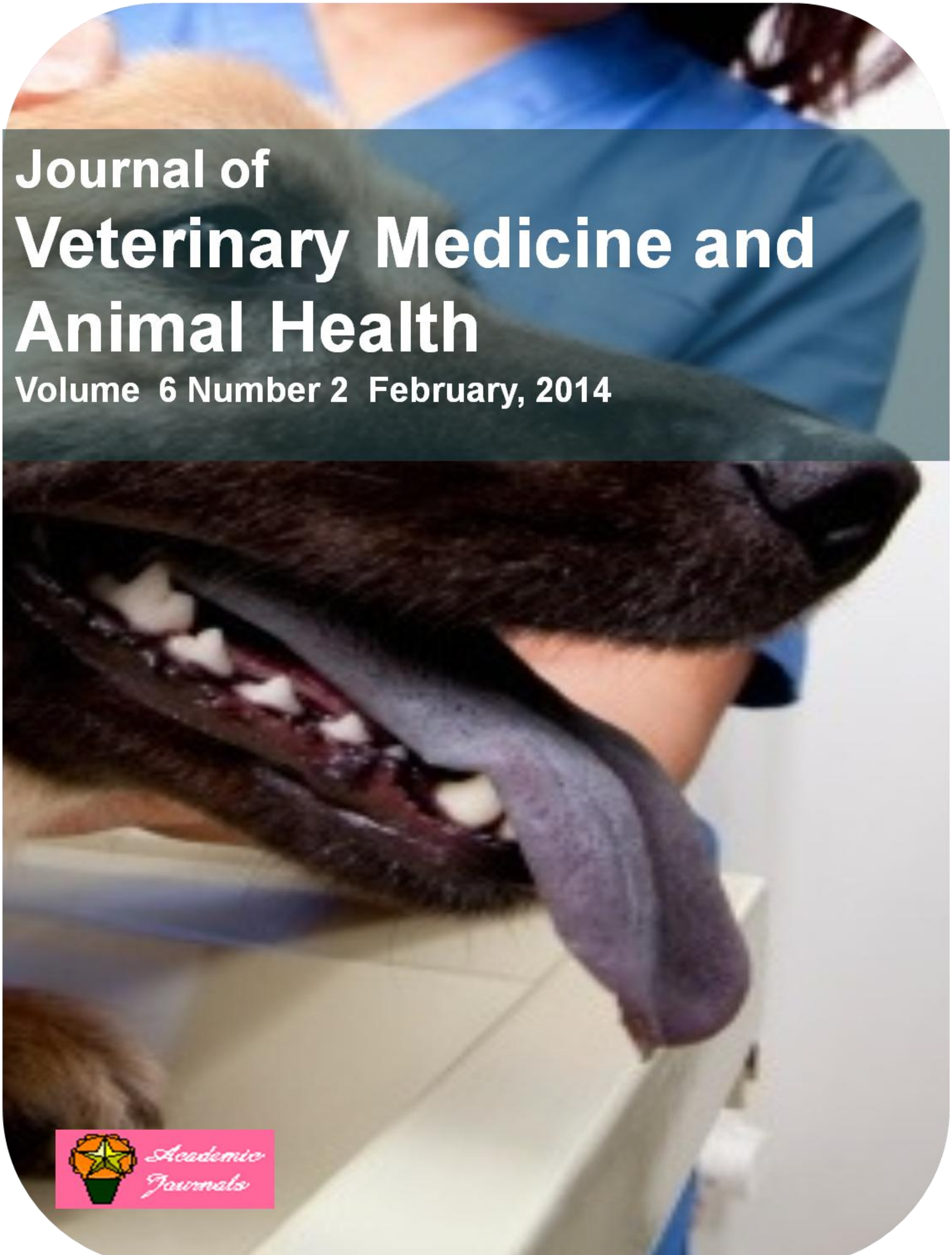
Journal of Veterinary Medicine and Animal Health

Volume 6 Number 2 February, 2014



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Charnley AK (1992). Mechanisms of fungal pathogenesis in insects with particular reference to locusts. In: Lomer CJ, Prior C (eds), Pharmaceutical Controls of Locusts and Grasshoppers: Proceedings of an international workshop held at Cotonou, Benin. Oxford: CAB International. pp 181-190.

Jake OO (2002). Pharmaceutical Interactions between *Striga hermonthica* (Del.) Benth. and fluorescent rhizosphere bacteria Of *Zea mays*, L. and *Sorghum bicolor* L. Moench for Striga suicidal germination In *Vigna unguiculata*. PhD dissertation, Tehran University, Iran.

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Journal of Veterinary Medicine and Animal Health

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Vol. 6(2), pp. 48-53, February, 2014
DOI: 10.5897/JVMAH12.015

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Journal of Veterinary Medicine and Animal Health

Full Length Research Paper

Gross pathological lesions of bovine tuberculosis and efficiency of meat inspection procedure to detect-infected cattle in Adama municipal abattoir

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Accepted 16 August, 2012

A cross-sectional study was conducted at Adama municipal abattoir from February 2010 to May 2011 to estimate the prevalence of bovine tuberculosis (BTB) and to evaluate the efficiency of meat inspection procedure to detect cattle infected with *Mycobacterium bovis*. The study only involved routine and detailed inspection at slaughter house. Chi-square test and test of agreement (Kappa value) were used to analyze the data. Out of 486 carcasses examined, 33 (6.79%) had lesions suggestive of tuberculosis. Routine abattoir inspection detected only 5 (15.15%) of 33 carcasses with visible lesion, and there was poor agreement (k = 0.14) between routine meat inspection and detailed post mortem examination. Anatomically, 67.7% of the lesions were found in lung and associated lymph nodes, 10.76% in mesenteric lymph node, and 9.2% in lymph nodes of the head and the remaining 12.3% were found in the prescapular, prefemoral and other lymph nodes and organs of the carcass. There was a significant difference (P < 0.05) in TB infection rate among different breeds, sex, and body conditions score (BCS). However, no significance difference (P > 0.05) was recorded between TB infection rate and ages of the animals. This study suggested that the relatively higher prevalence of BTB and low sensitivity of routine abattoir inspection warrant immediate attention.

Key words: Adama, abattoir, bovine tuberculosis.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by mycobacteria that has been a major health risk to man and animals for more than a century. It is widely distributed throughout the world affecting all age groups of humans and animals. In humans, it is responsible for more deaths than any other bacterial disease ever today (Bhatia and Ichpujani, 1994).

Bovine tuberculosis (BTB) is a disease characterized by formation of granulomatous nodules called tubercles whose locations depend largely on the route of infection. In calves, it is usually transmitted by ingestion and lesions involve the mesenteric lymph nodes with possible spread to other organs. In older cattle, infection is usually by the respiratory tract with lesions in the lung and dependent lymph nodes (Carter and Changappa, 1993).

BTB is an endemic disease of cattle in Ethiopia. It has been reported from different regions of the country based on tuberculin test (Ameni et al., 1999; Assegid et al., 2000) and abattoir inspection (Assegid et al., 2004). However, the prevalence of the disease has not been well established because of inadequate disease surveillance and lack of better diagnostic facilities. In 1971, the condemnation rate of carcasses with tuberculosis lied between 1 and 1.5% in Dire Dawa slaughter house (Teshome, 1995). Gezahegn (1991) compiled a five year (1985 to 1990) synthesis report of meat inspection in six

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abattoirs. Accordingly, from a total of 1,106,412 cattle slaughtered, generalized TB was the cause of whole carcass condemnation in 0.008%, but with wide differences. Later, Teshome (1995) reported a prevalence of 0.4% based on the 250,000 cattle slaughtered at Addis Ababa abattoir in 1991. In another preliminary study of bovine TB, Regassa (1999) found a prevalence of 8% for the cattle slaughtered in Soddo abattoir based on the identification of tuberculosis lesion. None of the post mortem cases however were confirmed. Ameni and Wudie (2003) reported a prevalence of 5.2% in Nazareth municipality abattoir. Examination at slaughter houses reported lower percentages of TB prevalence than tuberculin tests (Assegid et al., 2004) and this may indicate a high rate of non-specific reaction to tuberculin test.

Bovine tuberculosis is expected to have significant impact on the public health as 95% of the Ethiopian farmers are still keeping Zebu cattle using the traditional animal husbandry system, which consists of consuming animal product raw and often sharing the same shelter with animals (Laval and Ameni, 2004). Therefore, the objectives this study were to estimate the prevalence of BTB in animals slaughtered in Adama municipality abattoir, to assess the distribution of tuberculous lesions in slaughtered animals, and to evaluate the efficiency of abattoir inspection for the diagnosis BTB.

MATERIALS AND METHODS

Study area

The study was conducted, from February 2010 to May 2011, in Adama Town in the Eastern Shoa Zone of Oromia Regional State, Ethiopia. Animals slaughtered in Adama municipal abattoir come from different parts of the country, including Arsi, Bale, Afar, Harar, and Borena areas. The town has one municipality abattoir that supplies the inspected meat to more than 150,000 inhabitants and 82 legally registered butcheries. Each day on average, 60 heads of cattle are slaughtered in the abattoir starting from midnight. The history of all the cattle slaughtered at the abattoir about TB infection is not known and are not tested by the tuberculin test before slaughter. The TB status of the herd or the region from which cattle were brought to abattoir is also not known. Most of the cattle slaughtered in the abattoir were males of adult local zebu, 4 years of age and above which had entered in the feedlots late in their life. They were in fair to very good body condition. Very few numbers of female cattle were also slaughtered in the abattoir. These were cows culled, because of reproductive problems, poor performance and at the end of their reproductive life.

Study design

The study design followed was a cross-sectional study in which the prevalence of BTB was determined. The efficiency of routine abattoir meat inspection to diagnose TB lesions was also evaluated. A systematic random sampling procedure was used to include animals in the study. In general, 486 cattle and their carcasses were included in the study. This number includes 461 adult males and 26 adult females, and constitutes approximately 5 to 7 cattle for each visit day, which was done four times a week for four months.

Ante mortem examination

Cattle included in the sample size were examined physically before they are slaughtered. Breed, age, sex, and body condition score (BCS) of the animals were recorded. Additionally, body temperature, pulse rate, respiratory rate, type of nasal discharge (if present), condition of regional lymph nodes, and visible mucous membranes were examined and recorded for individual animals to be slaughtered to support the post-mortem inspection.

Post-mortem examination

Routine meat inspection

TB detection was conducted by assistant meat inspector of the abattoir, using the guidelines recommended by the Meat Inspection and Quarantine Division of the Ministry of Agriculture and Rural Development. The inspection involves palpation and incision of the lungs and liver, visual examination of intact organs like kidneys, and palpation and incision of lymph nodes mostly affected by TB such as tracheobronchial, mediastinal, medial retropharyngeal, parotid, prescapular, and prefemoral.

Detailed meat inspection

Inspection of each of the carcass was undertaken in detail according to Ameni et al. (2007) and Biffa et al. (2010). Particular emphasis was given during examination to certain organs and lymph nodes that were carefully inspected for the presence of suspected BTB lesions. The seven lobes of the two lungs, including the left apical, left cardiac, left diaphragmatic, right apical, right cardiac, right diaphragmatic, and right accessory lobes, were inspected externally and palpated. Then, each lobe was sectioned into 2 cm thick slices to facilitate the detection of lesions. Similarly, lymph nodes, namely, the parotid, submaxillary, mandibular, medial retropharyngeal, tracheobronchial, cranial and caudal mediastinal, hepatic, mesenteric iliac, precrural, prescapular, supramammary, inguinal, apical, and ischiatic lymph nodes, were sliced into thin sections (circa 2 mm thick) and inspected for the presence of visible lesions. Moreover, organs such as liver, kidneys, mammary gland and intestines were also thoroughly examined. The cut surfaces were examined under bright light for the presence of abscess, cheesy mass, and tubercles (Corner, 1994). When gross lesions suggestive of BTB were found in any of the tissues, the animal was classified as having lesions.

Data collection

The individual animal identification number, breed, sex, and age of the animal were recorded. Body condition scoring was made using a method developed for Zebu cattle (Nicholson and Butterworth, 1986). Age category was given by using the dental eruption and wear as described by De Lanta and Habel (1986). The range and frequency of anatomical sites where tuberculosis lesion were detected were also recorded for affected cattle.

Data analysis

The data collected from the study area was entered into Ms Excel spread sheets and was analyzed by using Intercooled Stata 7. Chi-square test and test of agreement (Kappa-value) methods were used for the analysis of the data. In all the analysis, P-value was held at <0.05 for significance.

Table 1. Comparison of the results of routine and detailed examination.

Routine meat inspection	Detailed meat inspection		Total
	Positive	Negative	
Positive	5	0	5
Negative	28	453	481
Total	33	453	486

Sensitivity = 15.15%; Kappa = 0.14.

Table 2. Prevalence of bovine tuberculosis in different breeds of cattle examined.

Breed	No. of animals examined	Positive	Percentage	P-value
Arsi	298	20	6.92	0.047
Boran	88	10	11.4	
Harar	57	0	0	
Kereyu	51	3	5.9	

RESULTS

The overall prevalence of BTB in cattle slaughtered in Adama municipality abattoir during the study period was 6.79 % based on detailed post mortem examination. Macroscopically, the most common changes seen in the affected organs and/or lymph nodes were the presence of circumscribed yellowish white lesions of various sizes and numbers. Miliary lesions were observed in the lung and liver in 2 of the 33 positive carcasses (6%). Large encapsulated nodules containing yellowish white exudates were observed in some of the affected organs. There were also active lesions with reddish to black demarcated necrotized areas, particularly on the lymph nodes of the suspected animals, but majority of the lesions collected were calcified.

Using detailed necropsy, 33(6.79%) carcasses were found to contain visible TB lesions. However, only 5 (1.02%) heads of cattle were found to have detectable TB lesions by the routine abattoir inspection (Table 1). Thus, the proportion of lesions detected by detailed necropsy to that of routine abattoir inspection procedure was found to be 6.6:1. The results of this study indicated that the probability of missing an animal with TB lesion during routine abattoir inspection was estimated to be 84.85%. A poor agreement (K = 0.14) was recorded between these two procedures. The average number of infected tissues per infected carcass was 1.3 and 72.7% of the animals had only a single lesion. The distribution and frequency of tuberculous lesions in different organs in cattle affected with mycobacterium is indicated in Tables 4 and 5, respectively. Lung and its associated lymph nodes are the most affected parts (67.7%), followed by mesenteric lymph nodes (10.76%), lymph nodes of the head (9.23%) and prescapular, prefemoral and other organs and tissues of the carcass (12.30%) (Table 5).

There was a significant difference (P = 0.047) in TB infection rates between the cattle breeds examined, the highest being in the Boran breed (11.4%) followed by Arsi (6.92%) and Kereyu (5.9%). The TB infection rate in Harar breed was zero (Table 2).

The study revealed statistically significant difference (χ^2 = 8.337, P = 0.004) in infection rates among males and females, the highest being in females (12%) as compared to males (6.5%). The result of this study also indicated a significant association between the prevalence of the disease and BCS where there was a significant difference (P = 0.003) between the two BCS. However, no significant difference (P = 0.069) in TB infection rate was recorded between the two age categories of the animals examined (Table 3).

DISCUSSION

This study detected tuberculosis lesions in 6.79% of cattle examined in Adama municipal abattoir. This prevalence is in agreement with the findings of previous studies done with similar diagnostic methods (Regassa, 1999; Ameni and Wudie, 2003; Teklu et al., 2004). However, the prevalence in this study is relatively lower as compared to the prevalence of the disease in dairy farms in Ethiopia (Ameni and Regors, 1998; Kiros, 1998; Ameni et al., 2001). This is also in line with other studies done in other countries which indicate lower infection rates in beef cattle than in the dairy (Pritchard, 1988).

The lower prevalence in the abattoir could be due to the fact that animals slaughtered in the abattoir are mainly Zebu, which are relatively resistant to BTB. Several studies have also indicated that not all cattle infected with *Mycobacterium bovis* have gross lesions of tuberculosis that are visible in the tissues examined at slaughter (Whiple et al., 1996). In this regard, many re-searchers have isolated *M. bovis* through bacteriological

Table 3. Prevalence of BTB with respect to sex, age, and BCS.

Variable	No. of animals examined	Positive	Percentage	χ^2	P-value
Sex					
Male	461	30	6.5		0.004
Female	25	3	12		
Age					
< 6 years	83	1	1.2	8.337	0.069
> 6 years	403	32	7.94		
BCS					
Fat	160	3	1.9		0.003
Medium	326	30	9.2		

Table 4. Distribution of TB lesions in organs of cattle slaughtered.

Organ	No. of specimens	Percentage
Lung	4	9.3
Tracheobronchial	13	30.03
Mediastinal	13	30.03
Medial retropharyngeal	4	9.3
Mandibular Ln	2	4.65
Mesenteric Ln	4	9.3
Prescapular Ln	1	2.32
Prefemoral Ln	1	2.32
Liver	1	2.32
Total	43	100

Table 5. Frequency of tuberculous lesions in different organs of cattle examined.

Anatomical site	No. of tuberculous lesions	Percentage
Tracheobronchial lymph node	19	29.23
Mediastinal lymph node	17	26.15
Medial retropharyngeal lymph node	4	6.15
Mandibular lymph node	2	3.07
Mesenteric lymph node	7	10.76
Lung	8	12.3
Liver	2	3.07
Prescapular lymph node	4	6.15
Prefemoral lymph node	2	3.07
Total	65	100

culture from lymph nodes and lungs with no visible lesions (Corner, 1994).

In this study, the sensitivity of routine abattoir inspection is found to be 15.15% with Kappa = 0.14 which shows that the routine abattoir necropsy procedure failed to detect 84.85% of tuberculous animals. This low sensitivity could be due to the low number of tissues inspected and the relatively high proportion of small lesions which could not be detected in routine inspection. Therefore, this finding indicates that the abattoir inspection procedures need to be improved, given that the sensitivity of gross postmortem examination is affected by the method employed and the anatomical sites examined (Corner, 1994). In line with this, several studies have reported that the prevalence of tuberculosis infection increases with enhanced meat inspection procedures such as multiple slicing of organs and lymph nodes (Corner, 1994; Whiple et al., 1996).

Previous studies have reported that the detailed necropsy alone detected above 84% of all lesions (Corner, 1994; Teklu et al., 2004). Therefore, detailed meat inspection can be considered as satisfactory procedure to detect tuberculous lesion.

In this study, gross tuberculosis lesions were found most frequently in the lymph nodes of thoracic cavity (67.7%), mesenteric lymph node (10.8%), followed by lymph nodes of the head (9.2%) and prescapular, prefemoral and other organs of the carcass (12.2%). This finding is consistent with previous studies done in Ethiopia (Firdissa, 2006; Nesredin, 2006) where 70 and 70.7% TB lesions were reported in lungs and associated lymph nodes, respectively. However, the distribution of TB lesion in the current study significantly differs from reports from Mexico (Miliano-suazo et al., 2000) where 49.2% of lesions involved the retropharyngeal lymph node. Corner (1994) has reported that up to 95% of cattle with visible TB lesions could be identified by examination of the lung and associated lymph nodes. This finding indicates that inhalation might be the principal route of TB infection in cattle. Therefore, during post mortem examination, focus should be given on lungs and associated lymph nodes. However, the presence of lesions in mesenteric lymph nodes indicates that the infection occurs through ingestion (Radostits et al., 1994).

The average number of infected tissue per infected carcasses was 1.3 and 72.7% of the animals that had only a single lesion. This finding complies with previous reports (Corner, 1994, Teklu et al., 2004; Nesredin, 2006) which emphasizes the possibility of missing a tuberculous carcass during routine inspection procedures. The failure to detect a lesion during abattoir inspection has the greatest significance in cattle with single lesion, since if the lesion is missed there is no further chance of detecting the disease in the animal.

The significant difference (P = 0.047) among the different local breeds of animals seems to be a reflection of management than breed, since most of the cattle fattened in a small scale fattening and large scale feedlots in the study area were mostly Boran and Arsi breeds signifying the role of intensification in tuberculosis infection. The study showed a significant difference in the prevalence (P = 0.004) between the two sexes being higher in females (12%) as compared to males (6.5%). This is possibly due to their longer productive life and other stressful factors (such as pregnancy, parturition, lactation, etc) associated with female animals (Miliano-suazo et al., 2000; Teklu et al., 2004). There is a statistically significant difference in the prevalence of the disease (P = 0.003) between BCS, the prevalence being the highest in medium body condition (9.2%) as compared to fatty animals (1.9%). This could indicate the wasting nature of the disease. The present result is consistent with previous reports which indicated that animals with good BCS have relatively good immunological response to the infectious agent than animals with medium BCS (Radostits et al., 1994). The proportion of tuberculosis infection was lower for less than 6 years age groups as compared to greater than 6 years age group categories; although, the difference is not statistically significant. This may be due to their young age or too early for them to develop tuberculosis lesion even if they were infected as compared to the old groups, which are managed in closed spaces. In addition, it may also be due to the chronic nature of the disease where the animals acquired the infection at young age and develop the clinical sign at old age or when the immune system of the animal is compromised (Radostits et al., 1994).

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Vol. 6(2), pp. 54-62, February, 2014
DOI: 10.5897/JVMAH2013.0260

http://www.academicjournals.org/JVMAH

Journal of Veterinary Medicine and Animal Health

Full Length Research Paper

Prevalence of gastrointestinal parasitism of cattle in East Showa Zone, Oromia Regional State, Central Ethiopia

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Accepted 9 December, 2013

This study was conducted from November 2011 to April 2012 in the East Showa Zone, Oromia Regional State, Central Ethiopia in four selected study area to investigate the prevalence, burden of helminths, and to asses associated risk factors. A total of 326 fecal samples were used for qualitative and quantitative coprological examination. The overall prevalence was 61% of gastrointestinal (GI) helminths and the prevalent helminthes eggs identified were *Strongyle* type egg (41%), *Fasciola* (36.5%), *Paraphostomum* (18.4%), *Toxocara* (7.7%), *Trichuris* (5.2%), and *Monezia* (2.8%). This result indicated the highest prevalence of *Strongyle* type eggs than other helminths egg and the lowest prevalence of *Monezia* egg. Out of 61% of infected animals 9.5% of prevalence was recorded in an animal having history of anthelmintic treatment while the rest 51.5% was recorded in the animal having no history of anthelmintic treatment. The 30.9% of animals were found to be infected with more than one helminths parasite. There was higher mean eggs per gram (EPG) in animals >7 years of age group, followed by animals <2 and 2 to 6 years age group. But no significant difference was observed among age groups except *Trichuris* (P = 0.006) that is high in animals <2 years of age and lower in animals 2 to 6 years of age. The occurrence of many GI helminths was found relatively higher in males than females. But there was no significant difference observed between sexes with exception of *Trichuris* that was higher in males. The mean burden of *Strongyle* and total EPG was found significant (P=0.00) among animals of different body condition. Finally, conclusions were drawn and recommendations were forwarded.

Key words: Age, anthelmintic, body condition, bovine GI helminths, East Showa, prevalence, sex.

INTRODUCTION

The growing demand for the meat and milk in developing world, changing function of livestock and changing consumers perspectives are the major driving forces in the global livestock sector during the next two decades (World Bank, 2001). Remarkable increase in human population and the movement of people from rural areas to urban centers will increase the demand for food of animal origin. By the year 2020 the global population is projected to consume about 120 million tons of meat and 220 million tons of milk above the current consumption (World Bank, 2001; Ibrahim and Olaloku, 2000).

Ethiopia is an agricultural country with over 85% of its population engaged in agricultural activity. It has diverse agro-ecological zones which contributes to the evolution of different agricultural production systems. Animal production forms an integral part of agricultural system in almost all ecological zones of the country (Tegegne and Crawford, 2003). The animal production systems is

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extensive, semi-intensive and intensive in Ethiopia and have 53 million heads of cattle (CSA, 2012). They serve as source of food, hides and important draught power for crop production. However, the productivity of these animals is severely reduced by malnutrition, low management system, low genetic potential and health problems. Among the livestock health problem, diseases caused by helminths parasite is highly prevalent and economically important in many parts of the world (Gracey, 1986).

Gastrointestinal parasite infection is one of the major causes of wastage and decreased productivity exerting their effect through mortality, morbidity, decreased growth rate, weight loss in young growing calves and late maturity of slaughter stock, reduced milk and meat production and working capacity of the animal mainly in developing countries (Newman, 1995). These effects largely relates to specific damage caused by the parasites including villous atrophy at the site of gastrointestinal nematode attachment and liver trauma resulting from the presence of migratory liver fluke (Murray and Rushton, 1997). Indirect effects have also been described, including altered feed intake, digest flow rate, nutrient absorption and liver metabolic activity, endocrine status and immunological response (Hansen and Perry, 1994).

A number of helminths species are known to infect cattle worldwide. The most important ones include nematodes like *Strongyle* species (*Haemonchus, Ostartagia, Trichostrongylus, Cooperia*) and trematodes of economic importance *Fasciola* species (*Fasciola hepatica* and *Fasciola gigantica*) and *Paraphistomum* species (*Paraphistomum cervei*), while cestodes like *Monezia* species (*Monezia benideni* and *Monezia expanza*) could also be important constraints in animal production (Onah and Nawa, 2000).

There are many associated risk factors influencing the prevalence and severity of GI helminths. These include age, sex, weather condition and husbandry or management practices (Khan et al., 2009). Gastrointestinal infection is one of the most prevalent diseases of ruminants in Ethiopia. A study conducted in and around Holleta indicated that the overall prevalence parasitic infections of cattle were 82.8%. The predominant helminths egg identified were trematodes (*Fasciola* and *Paraphistomum* spp.) 80.6%, *Strongyles* 66.25%, mixed infection (trematodes and *Strongyles*) 63.12%, while others such as *Trichuris* and *Monezia* 1.5% (Etsehiwot, 2005). Other study conducted on gastrointestinal (GI) parasite of ruminants in Western Oromia also showed that the overall prevalence of GIT parasites was 69.6% in cattle with predominant prevalence of *Strangles* and *Eimeria* parasite (Regassa et al., 2006). The present study is therefore initiated with the following specific objectives: to investigate the different types of GI helminths affecting cattle; to investigate the prevalence and worm burden of helminths population in cattle; to asses some risk factors associated with prevalence of cattle GI helminths.

MATERIALS AND METHODS

Study area

The study was conducted from November 2011 to April 2012 in East Showa Zone which is one of the 18 zones of the Oromia region. From this zone four study areas were selected, namely, Bishoftu and Ude from Ada'a, Dukem from Akaki and Chefe Donsa from Gimbichu district. Bishoftu was the center where this study was carried out. Bishoftu is located at 9°N latitude and 40°E longitudes at an altitude of 1850 m above sea level and situated in central highlands of Ethiopia. Bishoftu has an annual rain fall of 866 mm of which 84% falls in the long rainy season extending from June to September. The rain fall is bimodial. The mean annual maximum and minimum temperature ranges are 26 and 14°C, respectively (CSA, 2012).

Study animals

The study animals were cattle found in Bishoftu, Chefe Donsa, Dukem, and Ude. Cattle in the study areas were purposively selected for helminths egg examination. A total of 326 heads of cattle were examined during the study period.

Study design

Fecal sample collection

Fecal samples were directly collected per rectum with new, unused gloves for each animal. Each sample was put in plastic containers with lids and labeled with animal identification record including the age (based on their teeth eruption and by asking the owner), sex, body condition (thin, moderate and good) based on literature location, and date of anthelminthic treatment were recorded with indelible pen and 10 ml of 3% formalin was added into sample container. Then, the samples were kept in refrigerator at 4°C for later examinations.

Coprological examination

The collected faecal sample were processed and examined using qualitative techniques (floatation and sedimentation) as described by Urquhart et al. (1996) and quantitative parasitological techniques by using McMaster egg counting methods according to the standard procedures given by Soulsby (1982) and MAFF (1997). Those fecal samples that were positive for *Strongyles*, *Trichuris*, *Toxocara*, and *Monezia* were subjected to egg output (eggs per gram, EPG) of feces count using McMaster egg counting technique (Hansen and Perry, 1994) and the degree of infestation was categorized based on literature (Aiello and Mays, 1998). Sodium chloride was used as flotation fluid for this study by preparing in the laboratory.

Data analysis

Data was first entered into Ms Excel program (Microsoft Corporation, USA) and screened for errors that might have occurred during the entry. Any error detected was corrected by rechecking against the original data forms. The data was analyzed using SPSS 15 version and Pearson chi-square (χ^2) data analysis method was used to determine the association of prevalence of each GIT helminths with location, anthelminthic treatment, and body condition and host factors like sex and age of the animal. Result $P<0.05$ was considered as significant differences (Clark, 1992).

Table 1. Anthelmintic treatment history and prevalence of parasite.

Parameter	No. tested	Not treated (%)	Treated (%)	Total (%)	χ^2, p-value
Negative	266	98 (30)	29 (8.9)	127 (38.9)	4.19, 0.04
Positive	60	168 (51.5)	31 (9.5)	199 (61.1)	
Total	326	266 (81.5)	60 (18.4)	326 (100)	-

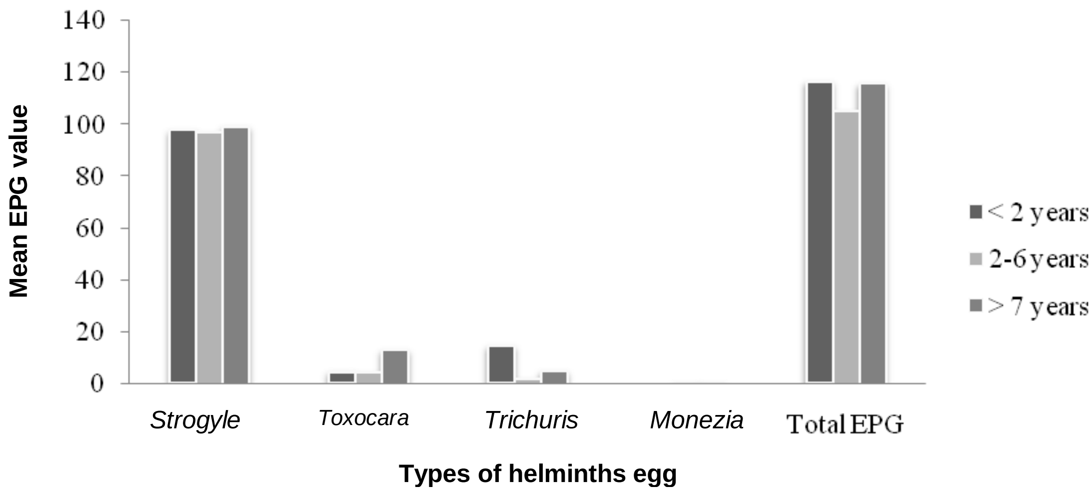

Figure 1. Comparison of mean EPG in animals of different age groups.

RESULTS

Coprologocal examination

From the total of 326 fecal samples examined by sedimentation, floatation and McMaster methods, the overall prevalence of GI helminths were found to be 61%.

Anthelmintic treatment history and prevalence of parasite

From the overall prevalence 61%, 9.5% of prevalence was recorded in an animal which had history of anthelmintic treatment, while the rest 51.5% was recorded in the animal with no history of anthelminthic treatment. The prevalence of parasite in animals having history of anthelmintic treatment was lesser than the animals with no history of anthelmintic treatment (Table 1). The quantitative examination shows that majority of animals positive for helminths 183 (56.1%) were infected at lower degree (<500 EPG), while few 16 (4.9%) animals were moderately (500 to 1000 EPG) infected, and there were no animals infected heavily (>1000 EPG). The egg of helminths identified with respective genera was *Strongyle* (41%), *Fasciola* (36.5%), *Paraphostomum* (18.4%), *Toxocara* (7.7%), *Trichuris* (5.2%), and *Monezia* (2.8%).

Prevalence and mean EPG of helminthes in animal of different age groups

The result revealed that the prevalence and mean burden of helminths parasite was higher in animals >7 years age group followed by animals <2 and 2 to 6 years age group, respectively; but with no significant difference (P>0.05) observed except *Trichuris* which was significant (P=0.02) between age groups that is high in animals <2 years of age and lower in animals of 2 to 6 years (Figure 1 and Table 2). The mean number of helminthic egg excreted by the cattle in the three age groups significantly varied for *Trichuris* (P= 0.006) as it was comparatively higher in age groups of <2 years. The significance was marginal for *Toxocara* (P=0.06) as shown in Table 3.

The prevalence of different GI helminthes in different study area

The prevalence or distribution different parasites genera were also different from one study area to another. The prevalence of most parasite genera were higher in Chefe Donsa than the prevalence recorded in Bishoftu, Dukem and Ude, except *Toxocara* that was found higher in Dukem and Ude (Table 4). The difference can be due to management or grazing system, regular deworming practice and sample size difference collected from each area.

Table 2. Prevalence of different GI parasite in animal of different age groups (n= 326) .

Helminths	Prevalence	<2 Years	2-6 Years	>7 Years	Total	χ^2, p-value
Fasciola	% within age group	28.9	31.0	34.5	36.5	2.59, 0.27
	% of total	4.0	12.5	15.0	36.5	
Paramphistomum	% within age group	26.7	17.3	16.9	18.4	2.38, 0.30
	% of total	3.7	7.4	7.4	18.4	
Strongyle	% within age group	53.3	38.1	40.8	41.4	3.27, 0.19
	% of total	7.4	16.3	17.8	41.4	
Toxocara	% within age group	6.7	6.5	9.2	7.7	0.79, 0.67
	% of total	0.9	2.8	4.0	7.7	
Trichuris	% within age group	13.3	2.9	4.9	5.2	7.56, 0.02
	% of total	2.1	1.2	1.8	5.2	
Monezia	% within age group	2.2	4.3	1.4	2.8	2.27, 0.32
	% of total	0.3	1.8	0.6	2.8	
Total		45	139	142	326	

The mean number of helminthic egg excreted by the cattle in the three age groups significantly varied for *Trichuris* (P= 0.006) as it was comparatively higher in age groups of <2 years. The significance was marginal for *Toxocara* (P=0.06).

Table 3. Mean burden of different GI helminths in different age groups.

Age group	No. tested		***Strogyle*** **EPG**	***Toxocara*** **EPG**	***Trichuris*** **EPG**	***Monezia*** **EPG**	**Total EPG**
<2 years	45	Mean	97.8	4.4	14.4	0	116.6
		Standard deviation	126.6	17.9	42.1	0	151.1
2-6 years	139	Mean	96.8	4.3	1.7	0.2	105
		Standard deviation	156.1	18.5	11.1	13.3	164.3
>7 years	142	Mean	99.3	13	4.9	0.3	115.8
		Standard deviation	157.7	45.6	23.3	4.2	183.9
Total	326	Mean	98.1	8.1	4.9	1.1	111.3
		Standard deviation	152.7	33.3	23.3	9.1	171.1
-		F-test	0.009	2.74	5.11	1.74	0.16
-		p-value	0.99	0.06	0.006	0.17	0.84

The prevalence and mean EPG of the GI helminths by sex

The prevalence of the GI helminths based on animal's sex was identified. Out of 137 female animal examined, the following were the infected *Fasciola* (38%), *Paraphistomum* (16%), *Strongyle* (44.5%), *Toxocara* (6.6%), *Trichuris* (2.0%), and *Monezia* (2.9%); whereas 189 male animals examined were infected with *Fasciola* (53%), *Paraphistomum* (20%), *Strongle* (39%), *Toxocara* (8.5%), *Trichuris* (6.9%) and *Monezia* (2.6%) parasite. There was relatively higher occurrence of all GI helminths in male animals than female animals. But sex had no significant effect on the prevalence of helminths parasite (Table 5). The mean burden of different helminths parasite was also assessed between sex of animal and revealed higher mean burden in male animals than female animals (Figure 2). The mean burden of *Trichuris*

Table 4. The prevalence of different GI helminths within different study area

Study area	No. tested	Name of the helminthes genera					
		Fasciola (%)	*Paraphist* (%)	*Strongyle* (%)	*Toxocara* (%)	*Trichuris* (%)	*Monezia* (%)
Chefe Donsa	98	54 (55.1)	39 (39.8)	51 (52.1)	6 (6.1)	14 (14)	6 (6.1)
Bishoftu	53	11 (20.7)	3 (5.7)	15 (28.3)	2 (3.8)	2 (3.8)	1 (1.9)
Dukem	69	25 (36.2)	14 (20.3)	34 (49.3)	8 (11.6)	0 (.0)	1 (1.4)
Ude	106	29 (24.4)	4 (3.8)	35 (25.9)	9 (8.5)	1 (.9)	1 (.9)
Total	326	119 (36.5)	60 (18.4)	191 (41)	25 (7.7)	17 (5.2)	9 (2.8)

Table 5. Prevalence of the helminths parasite between sexes of animals (n=326).

Helminths	prevalence	Female	Male	Total	X^2, p-value
Fasciola	% within sex	38	35	36.5	0.215, 0.643
	% of total	16	20	36.5	
Paramphistomum	% within sex	16	20	18.4	0.866, 0.352
	% of total	6.7	11.6	18.4	
Strongyle	% within sex	44.5	39	41.4	0.945, 0.331
	% of total	18.7	22.7	41.4	
Toxocara	% within sex	6.6	8.5	7.7	0.403, 0.525
	% of total	2.8	4.9	7.7	
Trichuris	% within sex	2.9	6.9	5.2	2.518, 0.113
	% of total	1.2	4.0	5.2	
Monezia	% within sex	2.9	2.6	2.8	0.022, 0.881
	% of total	1.3	1.5	2.8	
Total		137	189	326	-

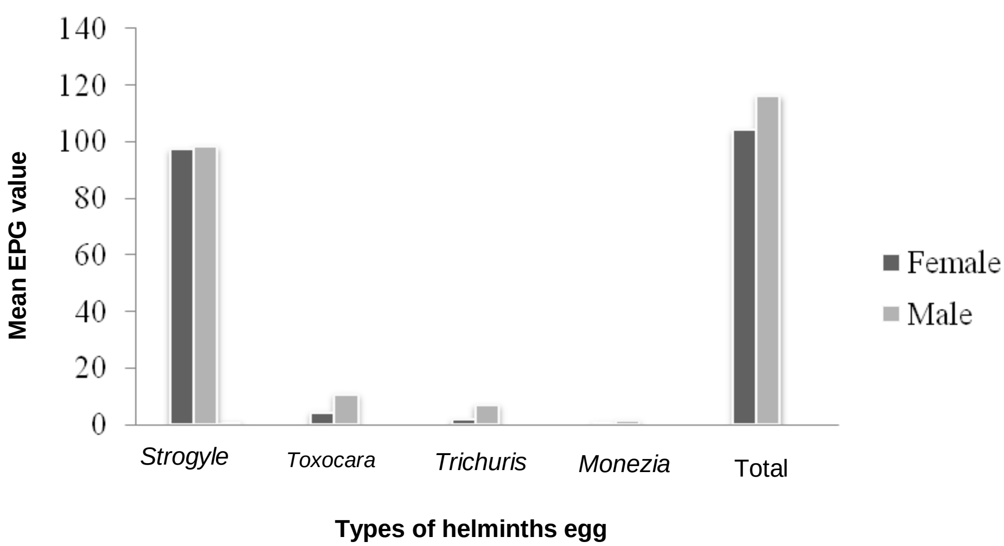

Figure 2. The comparison of mean EPG burden of helminths between sexes of animal.

Table 6. The mean burden of helminths parasite between sexes of animal.

Sex	No. tested		*Strogyle* EPG	*Toxocara* EPG	*Trichuris* EPG	*Monezia* EPG	Total EPG
Female	137	Mean	97.4	4.4	1.8	0.7	104.3
		Standard deviation	139.1	18.6	11.2	6	147
Male	189	Mean	98.4	10.8	7.1	1.3	116.4
		Standard deviation	162.2	40.6	28.9	10.8	186.7
Total	326	Mean	98	8.1	4.9	1.1	111.3
		Standard deviation	152.7	33.3	23.3	9.1	171
-	-	F-test	0	3.01	4.16	0.33	0.38
-	-	p-value	0.95	0.08	0.04	0.56	0.53

showed significant difference (P=04) between sex which is 7.1 in males and 1.8 in females (Table 6).

Animals that were found positive for helminths parasites harbored one or more parasite. The animals were found with multiple parasite infection, where 101 (31%) out of the total animals were examined. Mixed infection investigated within age group was 44.4, 20.9 and 31% in cattle <2, 2 to 6 and >7 years, respectively. The *Fasciola* and *Strongyle* combination prevalence was found higher (9.2%) by preceding the combination occurrence of *Fasciola, Paraphistomum*, and *Strongle* (5.5%) than other helminths combination prevalence in different age groups (Table 7).

During the study period, the fecal sample was collected with the history of animal body condition. Fecal examination revealed that each animal within thin, moderate, and good body condition were found to discharge an average of 163.4, 115.2, and 76.6 EPG, respectively. There was significant difference among body condition on mean EPG of *Strongyle* and total EPG (P=0.0) which was higher in thin animals and lower in animals with good body condition (Table 8 and Figure 3).

DISCUSION

The preset study showed the overall prevalence of GI helminths to be 61%. This result is very close to the report on gastrointestinal helminths prevalence in zebu cattles by Teka (2008) and relatively higher than the report on dairy cow by Derib (2005) in Bahir-Dar and its surrounding which is 59.5 and 50%, respectively. The higher prevalence was also reported by Etshiwot (2004) to be 82.8% in Holleta and its surroundings and by Zerfu (1991) to be 81% in Assela and its surroundings. The prevalence difference in different study area could have resulted from difference in management system, topography, deworming practices, and climatic condition that favors the survival of infective stage of the parasite and intermediate hosts.

According to the current study result which indicated the prevalent helminths egg with respect to their genera were *Strongyle* (41%), *Fasciola* (36.5%), *Paraphostomum* (18.4%), *Toxocara* (7.7%), *Trichuris* (5.2%), and *Monezia* (2.8%). In this result, the *Strongle* species were highly prevalent than other parasite genera. But in previous reported studies (Derib, 2005; Etsehiwot, 2004; Zerfu, 1991), trematodes were found to be the dominantly prevalent than *Strongyle* species. The prevalence of *Paraphistomum* (60%) reported by Manaye (2002) was quite higher than the current finding. The *Monezia* prevalence (2.8%) reported by Etsehiwot (2004) was found similar with the current study prevalence. The prevalence difference among the genera of helminths in different study area indicates that the topography and climatic condition of each study area vary from one another in supporting infectivity of different parasite and development of their intermediate hosts.

The coprological examination of collected fecal sample revealed the mean prevalence of different helminthes genera in animals of different age groups and indicated the higher prevalence of *Trichuris* in animals <2 years. This finding is in harmony with reports of Manaye (2002) on bovine GIT helminthes in Assela and its surrounding highlands. Watson and Gill (1991) reflected common ground which young animals are believed to be more susceptible to parasitic and non parasitic infections. On the contrary, the result shows that *Strongyle* species are prevalent almost similarly in animals of all age groups which disagree with the aforementioned general belief. Previous report by Teka (2008) showed that there was no prevalence difference between ages.

There was higher occurrence of all GI helminths in male animals than female animals. But sex had no statistical significant effect on the prevalence of helminths parasite. The mean burden of different helminths parasite was also assessed between sex of animal and revealed higher mean burden in male animals than female

Table 7. Prevalence of mixed infection within age group.

Name of mixed helminthes	<2 years (%)	2-6 years (%)	>7 years (%)	Total (%)
Positive	20 (44.4)	27 (20.9)	44 (31)	101 (31)
F and P	2 (4.4)	2 (1.4)	3 (2.1)	7 (2.1)
F and S	2 (4.4)	13 (9.4)	15 (10.6)	30 (9.2)
F, P and TV	0 (.0)	1 (0.7)	0 (0.0)	1 (0.3)
F, P and S	4 (8.9)	6 (4.3)	8 (5.6)	18 (5.5)
F, S and T	1 (2.2)	1 (0.7)	1 (0.7)	3 (0.9)
F, P, S and TV	0 (.0)	3 (2.2)	1 (0.7)	4 (1.2)
F, P, S and T	1 (2.2)	3 (2.2)	2 (1.4)	6 (1.8)
F, S and M	0 (.0)	1 (0.7)	0 (0.0)	1 (0.3)
F, S and TV	1 (2.2)	1 (0.7)	3 (2.1)	5 (1.5)
P and S	4 (8.9)	1 (0.7)	4 (2.8)	9 (2.8)
P, S and T	1 (2.2)	0 (0.0)	0 (0.0)	1 (0.3)
P, S and M	0 (.0)	1 (0.7)	0 (0.0)	1 (0.3)
P and T	0.0	0 (0.0)	1 (0.7)	1 (0.3)
S and TV	1 (2.2)	1 (0.7)	4 (2.8)	6 (1.8)
S and T	3 (6.7)	0 (0.0)	1 (0.7)	4 (1.2)
S and M	0 (.0)	1 (0.7)	0 (0.0)	1 (0.3)
TOTAL	45	129	142	326

F= *Fasciola*, P= *Paraphitomum*, S= *Strongyle*, TV= *Toxocara vitulorum*, T=*Trichuris*, M= *Monezia*

Table 8. The mean EPG of different GI helminths in animals of different body condition.

Body condition	No. tested		*Strogyle* EPG	*Toxocara* EPG	*Trichuris* EPG	*Monezia* EPG	Total EPG
Good	107	Mean	63.1	7	6.5	0.9	76.6
		Standard deviation	128.5	31.1	23.8	9.7	145.5
Medium	174	Mean	102.6	9	2.6	1.1	115.2
		Standard deviation	148.6	35.1	16.4	9.2	163.4
Thin	45	Mean	163.3	7.8	10	1.1	178
		Standard deviation	195.2	32	39.3	7.5	229
Total	326	Mean	98	8.1	5	1.1	111.3
		Standard deviation	152.7	33.3	23.4	9.1	171
-	-	F-test	7.3	0.1	2.2	0.01	5.9
-	-	p-value	0	0.9	0.1	0.9	0

animals. The mean burden of *Trichuris* showed significant difference between sexes of animals which was 7.1 in males and 1.8 in females. Insignificant difference between sexes is similar with previous studies reported (Teka, 2008; Manaye, 2002) except significant difference between sexes on the prevalence of *Trichuris* in the current findings.

Fecal examination revealed that each animal within thin, moderate, and good body condition were found to discharge helminthes egg with an average of 163.4, 115.2, and 76.6 of EPG, respectively. There was significant difference among body condition on mean EPG count of *Strongyle, Trichuris* and total EPG which was higher in thin animals and lower in animals with good body condition. This finding contradicts the findings of Manaye (2002) who reported absence of significant difference on the prevalence of helminths in animals of different body condition. This might be that the animal in previous study done by Manaye (2002) could be in the good plane of nutrition that enables them to support

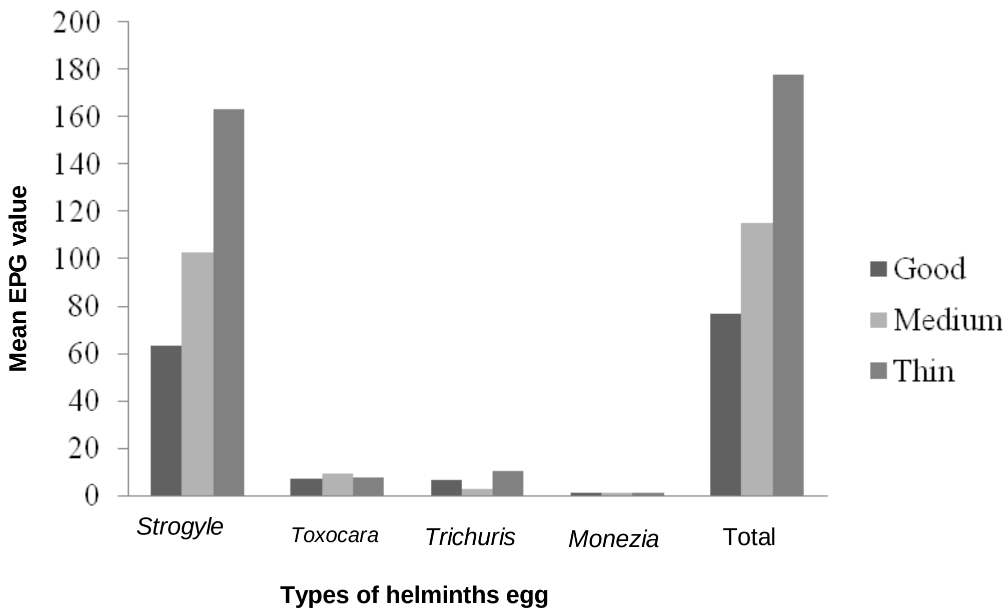

Figure 3. Comparison of mean EPG in animals with different body condition.

parasite infection without showing clinical helminthiosis. But animals of current study were possibly feed on crop residue like wheat and teff straw that is less nutritious, and infected animals can easily show clinical helminthiosis.

The aforementioned result showed that no animals were infected at higher intensity of parasite egg. This might be due to the fact that species of helminths prevalent in the area could be less reproductive (not prolific egg layers) or parasite at immature stage is higher than mature one. On the other hand, even if the higher burden of the parasite egg was not recorded; some infected animals were found with thin body condition that is direct in relation with the number of parasite egg. The change in body condition could be the possible indicator that the animals were infected both, with mature and immature stages or with less reproductive blood sucking parasite that can cause considerable damage to the host.

CONCLUSION AND RECOMMENDATIONS

Gastro-intestinal helminthes are important cattle health problems in the study area. Geographical location of the study area, body condition, age, sex, and anthelmintic therapy status considered as a risk factors for helminths infection had a varying degree of contribution for helminths infection. The mean egg per gram also varied due to the aforementioned risk factors among different animals.

Based on the aforementioned conclusion, the following recommendations are indicated: significance of these parasites should not be underestimated as they reduce the growth, productivity, reproductive potential of animals; strategic treatment and awareness creation should be adopted as former livelihood relies on rearing cattle; this study did not consider the breeds of animals, management and feeding systems, seasonal helminths dynamics, and identification of parasite to species level. Therefore, future detailed works should be undertaken.

ACKNOWLEDGEMENT

The authors would like to thank the College of Veterinary Medicine and Agriculture, Addis Ababa University for their unreserved cooperation and facilities that they provided for this study.

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academicJournals

Vol. 6(2), pp. 63-66, February, 2014
DOI: 10.5897/JVMAH2013.0245

http://www.academicjournals.org/JVMAH

Journal of Veterinary Medicine and Animal Health

Full Length Research Paper

Spermatozoa morphology and characteristics of *Spondias mombin* L. (*Anacardiaceae*) protected male Wistar rats exposed to sodium arsenite

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Accepted 30 December, 2013

The sperm protective potential of *Spondias mombin* L in arsenic-treated rats was carried out. Thirty-five male albino rats (225 to 228 g) were used and grouped into 7 (A to G), each group containing 5 rats. Group A was treated with 0.1 ml dimethyl sulphoxide (DMSO), B (0.1 ml of distilled water), C (sodium arsenite (SA-2.5 mg/kg body weight), D (ethyl acetate fraction), E (ethyl acetate fraction for 7 days and sodium arsenite the 7th day), F (methanolic fraction for 7 days and sodium arsenite the 7th day) and G (methanolic fraction for 7 days). It was observed that groups G and E had the lowest percentage motility 25.00±15.00 and 38.00±13.90%, respectively which were significantly lower ($P<0.05$) than groups A and B (89.00±2.45 and 85.00±3.16%), respectively. Percentage motility of groups A to D was similar but higher ($P<0.05$) than groups E to G. The morphological characteristics ranged between 10.88 and 12.74% in all the groups. In this study, motility of the sperm cells in groups A to D and F were above 60%. This indicated that the sperm motility in these groups was not affected by the treatment. However, groups E and G showed a reduction in percentage motility and viability. The study concluded that *S. mombin* fractions did not affect sperm cells structurally but treatment with ethyl acetate and methanolic fraction caused significant reduction ($P<0.05$) in percentage motility and viability, thus may precipitate infertility.

Key words: *Spondias mombin*, Wistar rats, spermatozoa characteristics, sperm morphology, sodium arsenite.

INTRODUCTION

Spondias mombin L. (Anarcardiaeae), synonym *Spondias lutea*, is commonly known as hog plum, yellow mombin or ubos. Locally called ‘atoaa’ in Ashanti, is a delicious erect tree which grows to 15 to 20 m tall with a trunk of 60 to 75 cm wide. It has a grayish bark, slightly buttressed, thick, coarse trunk (Burkill, 1985).

It is traditionally known widely for the treatment of a variety of disease conditions. Its bark, leaves, roots and fruits are used in various ways. *S. mombin* leaves are among the forages usually fed to domestic animals in South Eastern Nigeria. The juvenile leaves are also cooked as green vegetables (Ayoka et al., 2008). The leaves are also being used in the treatment of bacterial infections, the prevention and inhibition of the progression of viral infections, treatment of candida infections, and expelling parasites such as intestinal worms. It is also known to reduce anxiety, stop convulsions, calm and sedate, relieve pain and suppress cough. It has been reported that it aids digestion and stimulates the uterus (Corthout et al., 1988; Caceres et al., 1995; Ademola et al., 2005; Amadi et al., 2007). The bark is reported to reduce inflammation, relieve pain, reduce spasms, kill fungi

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fungi and bacteria, heal rashes and wound and stop bleeding. It has also been used as a contraceptive (Villegas et al., 1997; Uchendu et al., 2008). The stem bark and fruit juices of the plant have been widely used for both medicinal and non-medicinal purposes. The tree is commonly used for living fences, in farmlands and shelter by artisans.

Millions of persons in the world especially in the developing countries are exposed to inorganic arsenic compounds through drinking water and are suffering from its chronic or acute toxic effects. Arsenic compound is widely distributed in nature in many forms and its compounds are used extensively as components of herbicides, insecticides, rodenticides, food preservatives, and drugs (Baxley et al., 1981; Mustafa et al., 2010). Ingestion of the metalloid in drinking water presents the greatest hazard. Efforts to prevent and treat arsenic toxicity by therapeutic measures had only limited success (Yousef et al., 2008). A positive correlation between dietary supplementation with certain vegetables and plants and the reduction of toxic effects of various toxicants, environmental agents including heavy metals has been established (Nandi et al., 1997).

Arsenic, a well-documented human carcinogen, is a naturally occurring metalloid present in food, soil and water. This is released in the environment via natural and man-made processes (Tchounwou et al., 1999). Exposure to arsenite has been linked to diverse effects in both experimental animals and humans (Prasad and Pandey, 1984; Waalkes et al., 2003).

S. mombin leaves are among the forages usually fed to domestic animals in South Eastern Nigeria but there is dearth of information on its effects on the spermatozoa characteristics and morphology of Wistar strain albino rats exposed to arsenic toxicity.

This study was therefore carried out to investigate the effects of the chromatographic fractions of *S. mombin* on the semen characteristics and morphology of male Wistar rats exposed to sodium arsenite (SA).

MATERIALS AND METHODS

Chemicals and plant

SA (0.05 M $NaAsO_2$, Sigma–Aldrich, USA) was diluted with glass-distilled water to concentrations of 2.5 mg/kg body weight corresponding to 1/10th of the oral LD_{50} of the salt. Freshly prepared solution was used for each experiment.

S. mombin L (Anacardiaceae) leaves were collected from the botanical garden of the University of Ibadan and authenticated at the Department of Botany, University of Ibadan, Nigeria. Leaves of *S. mombin* were washed with clean water and air-dried. Leaves were ground into fine powder and defatted in hexane. Cold extraction was done by soaking the defatted ground leaves using 96% ethanol. Extract was collected and concentrated using rotary evaporator under reduced pressure at a temperature of 40°C. Ethanolic extract was subjected to fractionation using Vacuum Liquid Chromatography (VLC) technique with varying graded concentrations of hexane, ethyl acetate and methanol. Eluents were collected and spotted on thin layer chromatography aluminum plate GF_{254} (TLC), subjected to a mobile phase, allowed to dry and observed under UV light. Eluents with similar refractive index (Rf) on spotting were pooled together and used.

Extract suspensions were freshly prepared in dimethyl sulfoxide (DMSO), which served as vehicle and negative control. Suspensions were administered orally to the rats at a dose of 100 mg/kg body weight. Volumes of extract administered did not exceed 0.2 ml. Prepared suspensions were kept at room temperature in the Laboratory.

Experimental animals

Thirty-five adult male albino (Wistar strain) (125 to 228 g) were used after which ethical clearance had been obtained for the study. Animals were obtained from the experimental animal house of the Department of Veterinary Physiology, Biochemistry and Pharmacology, Faculty of Veterinary Medicine, University of Ibadan, Ibadan, Nigeria.

Animals were healthy and kept in steel laboratory cages (60 × 60 × 50 cm). All animals were kept under controlled conditions of temperature (25 ± 2°C), relative humidity (50 ± 15%) and normal photoperiod (12 h light and 12 h dark). The animals were fed on a standard rat diet (commercial pellet diet from Kesmac Feed Industry, Ibadan, Oyo State, Nigeria) and given water *ad libitum*.

Experimental protocol

Thirty-five clinically healthy male albino rats (225 to 228 g) were grouped into 7 (A to G) in which each group contains 5 rats. Animals were acclimatized before use and the treatment groups were as follows: group A was treated with 0.1 ml DMSO, B (0.1 ml of distilled water), C (SA 2.5 mg/kg body weight), D (ethyl acetate fraction (FB)), E (ethyl acetate fraction for 7 days and SA on the 7th day), F (methanolic fraction for 7days and SA on the 7th day) and G (methanolic fraction for 7 days (FC)) .

Animals in groups A and B served as negative controls. Twenty-four hours after the last treatment of SA extract, samples were collected from all the animals after which they were sacrificed by cervical dislocation.

Semen collection and analysis

The rats were anaesthetized with diethyl ether before sacrifice, the mid caudoventral abdominal incision was made with sterilized scissors, permitting instant access to the testis once pushed upward from the scrotum. The testes were then separated from the epididymis. The right and left epididymides were trimmed off the body of the testes and semen sample was collected from the tail of the epididymis through an incision made with a scalpel blade. The semen was dropped on warm glass slide and stained using warm Wells and Awa stains for morphological studies and Eosin-Nigrosin stain was used to stain for live/dead ratio. Also, percentage motility was carried out using 2 to 3 drops of 2.9% warm buffered sodium citrate kept at body temperature.

Percentage viability

This was done by staining one drop of semen and one drop of warm Eosin-Nigrosin stain on a warm slide. A thin smear was then made of mixture of semen and stain. The smear was air dried and observed under the microscope. The ratio of the *in vitro* dead sperm cells was observed and it is based upon the principle of

Table 1. Mean values for percentage motility and viability of albino rats in different treatment groups.

Parameter	Group A	Group B	Group C	Group D	Group E	Group F	Group G
Motility (%)	89.00±2.45	85.00±3.16*	83.20±13.31	81.25±4.27	38.00±13.90*	66.00±2.45*	25.00±15.00*
Viability (%)	97.40±0.60	96.80±0.74*	84.00± 6.03	81.50±5.61	50.00±12.65*	86.00±2.92*	57.00±11.58*

*Mean difference is significant at (P<0.05).

Table 2. Mean values for spermatozoa morphology of albino rats in different treatment groups.

Parameter	Tailess head (%)	Headless tail (%)	Rudimentary tail (%)	Bent tail (%)	Curved tail (%)	Curved mid-piece (%)	Bent mid-piece (%)	Coiled tail (%)	Total abnormal cells (%)	Total normal cells (%)
Group A	1.19±0.14	1.04±0.15	0.39±0.09	2.09±0.11	1.99±0.11	2.08±0.12	1.98±0.11	0.39±0.09	11.17	88.83
Group B	1.04±0.14	1.19±0.14	0.49±0.11	2.38±0.19	2.24±0.08	2.38±0.16	2.23±0.13	0.49±0.16	12.45	87.55
Group C	1.03±0.14	1.03±0.15	0.44±0.09	1.87±0.12	1.92±0.12	2.07±0.19	2.07±0.12	0.43±0.12	10.88	89.12
Group D	1.13±0.33	1.00±0.25	0.37±0.13	2.72±0.04	2.47±0.03	2.47±0.22	2.59±0.09	-	12.74	87.26
Group E	1.23±0.13	1.13±0.17	0.37±0.07	2.30±0.09	2.21±0.11	2.17±0.16	2.27±0.13	0.43±0.11	12.12	87.88
Group F	1.28±0.16	1.23±0.11	0.35±0.06	2.07±0.39	2.52±0.12	2.43±0.21	2.27±0.14	0.29±0.05	12.45	87.55
Group G	1.04±0.15	1.04±0.14	0.43±0.12	2.42±0.14	2.22±0.10	2.37±0.17	2.37±0.11	0.39±0.10	12.28	87.72

*Mean difference is significant at (P<0.05).

Eosin penetrating and staining the dead autolysing sperm cells whereas viable sperm repel the stain (Zemjanis, 1977).

Percentage motility

It was evaluated with a drop of semen with drop of 2.9% buffered sodium citrate on a warm glass slide covered with a glass slip and viewed at a magnification of ×40. Only sperm cells moving in a unidirectional motion were included in the motility rating, while sperm cells moving in circles, in backward direction or pendulating movement were excluded.

Data analysis

The data generated was analyzed using one way analysis of variance (ANOVA). SPSS Version 15 for Windows (SPSS Inc, 2006) and Microsoft Excel Professional Plus (Microsoft Corporation, 2010) were used to carry out all procedures.

RESULTS

It was observed that groups G and E had the lowest percentage motility (25.00±15.00 and 38.00±13.90%), respectively and significantly lower (P<0.05) than groups A and B (89.00±2.45 and 85.00±3.16%), respectively which were negative controls. Percentage motility of groups A to D was similar but higher (P<0.05) than groups E to G (Table 1).

Group C treated with SA and group D of fraction B had 83.20±13.31 and 81.25±4.27% of motility, respectively. This indicated that the treatment did not affect the percentage motility negatively. Group E motility was 66.00±2.45%, though significantly less than the negative control groups A and B, the percentage were still within normal range for insemination.

The percentage abnormality in various parts of the sperm cells ranges between 10.88 and 12.74% in both control and treatment groups. It was also observed that spermatozoa of both treated and untreated groups were affected structurally or morphologically (Table 2).

DISCUSSION

For animals to be classified satisfactorily in terms of breeding soundness examination, the percentage sperm motility and livability must not be less than 60% (Zemjanis, 1977). In this study, motility of the sperm cells in groups A to D and F were above

60%. This showed that both the sperm percentage motility and livability in these groups were not affected by the treatment.

It was observed that group E, treated with B (Ethyl acetate fraction) and G treated with fraction C (methanolic fraction) were adversely affected. The percentage motility in these groups was 38.00±13.90 and 25.00±15.00%, while the percentage livability was 50.00±12.65 and 57.00±11.58%. These can precipitate infertility since the sperm percentage motility and percentage livability were low. The findings of Hafez (1993) support our observations which revealed that high percentage motility and livability will result in high fertility potential.

It was also believed that fractions B and C with or without SA proved to be anti-fertility since the sperm cells died easily and percentage motility was negatively affected. The morphological characteristics were observed in all the groups to be within the normal range of 10 to 20% (Zemjanis, 1977; Hafez, 1993).

The observation of the result in all the groups indicated that the plant extract and SA did not affect spermatozoa structurally.

Conclusion

In conclusion, the *S. mombin* fractions did not affect sperm cells structurally, but treatment with ethyl acetate fraction and methanolic fraction caused significant reduction ($P<0.05$) in percentage motility and viability, thus may precipitate infertility. This implies that the two fractions have no protective effect against arsenic toxicity in Wistar strain albino rats.

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Vol. 6(2), pp. 67-68, February, 2014
DOI: 10.5897/JVMAH2013.0238

http://www.academicjournals.org/JVMAH

Journal of Veterinary Medicine and Animal Health

Short Communication

Comparison between rolling and surgical treatment of uterine torsion in buffaloes (*Bubalis bubalis*) in Basrah province

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Accepted 24 July, 2013

A number of 30 buffaloes with uterine torsion were described in a period of 2010 to 2011 in our clinic in Basrah Province Alnashwa. All animals were treated first by rolling but only four cases responded and were corrected by this method, 86.67% of cases were corrected by caesarian section (CS). We found that the right uterine torsion was more incidence 73.33% than left uterine torsion, from the result, we found 4 cases of uterine torsion with malprsentation. The fetus survivability after caesarian section was only 46.51%. The study concluded that caesarian operation in early diagnosed uterine torsion in buffaloes is the best method for saving the fetal and maternal life in case of rolling failure.

Key words: Buffaloes, Basrah Province, uterine torsion

INTRODUCTION

The uterine torsion is one of the most important causes of dystocia which occur in most cases in the last 60 day of gestation. Uterine torsion is defined as a rotation of pregnant uterus around its longitudinal axis. It is divided into right or left according to direction, mild, moderate or severe according to degree and pre-cervical, cervical or post-cervical according to position (Amer and Hashem, 2008). The torsion is usually located between 45 to 180 degree but in some cases, torsion up to 720 degree has also been reported. The exact mechanism and etiology of torsion is unknown. It has been noted to occur in the presence of intra-abdominal adhesion, ovarian tumors and abnormal presentation of fetus (Cook and Jenkin, 2005).

Caesarian operation is one of the most common surgical procedure performed by veterinians and is considered as a routine obstetrical technique (Amer et al., 2008). It has a high maternal and fetal surviving rate. The advantages of caesarian operation in uterine torsion are to save maternal and fetal life and maintainace of fertility (Vermunt, 2008). The operation should be performed immediately in the failure of expulsion of fetus few hours after the signs of first stage of labor begin (Krishnakumar et al., 2008)

MATERIALS AND METHODS

A number of 30 buffaloes having uterine torsion were described in the period between 2010 and 2011 in our clinic in Basrah Province. The diagnosis of uterine torsion was done by history, clinical examination, rectal and vaginal palpation. The clinical signs include the animals isolating themselves from others in the group and showing signs of first stage labor but the fetal membranes do not appear at the valve, vaginal lumen was typically dry, lacking mucus

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according to the degree of torsion. As the hand passed into the vagina or the rectum, there was a distinct twist which can be either clockwise or anti-clockwise (Beardon and Fuquay, 1997).

The animal was treated first by rolling by using of wooden bar; surgical treatment was made in case of rolling failure. 86.67% of animals did not respond to rolling, the caesarian sections were made on these animals. The operative site was prepared for aseptic surgery and left ventrolateral side laparotomy performed under the local infiltration (Amer et al., 2008) after removal of fetal and decomposed mass. The uterus was exposed as much as possible and cleaned with diluted povidone iodine solution and all fluid accumulated in the uterus was siphoned out. The cut edges of uterus were inverted with cushing sutures using No.3 chromic catgut, the abdominal skin incision were closed by routine standard procedure and it should be followed up for at least one week to know the result of caesarian section (CS) on delivered animals (Krishnakumar et al., 2008).

RESULTS AND DISCUSSION

In the recent study, uterine torsion can be diagnosed by rectal or vaginal palpation; with clinical signs of abdominal pain, the animal was uncomfortable, arching of the back, straining, and some time kicking of the abdomen, the valve and vaginal lumen were dry and did not contain mucus. This result was in agreement with Beardon and Fuquay (1997) who reported the same clinical signs associated with uterine torsion. Rectal palpation was another important route for diagnoses of uterine torsion. The uterus was felt to be turned to the right or left direction (Aubery et al., 2008; Cebra et al., 1997). In this study, we found that the right side uterine torsion was of more than 100 degree incidence (73.33%) than the lift side uterine torsion. This result was in agreement with Moore and Richardson (1995). This may be due to the location of rumen into the left side of abdomen that prevents left uterine torsion. In this study 4 animals showed uterine torsion with abnormal fetal presentation appearing during caesarian operation, this may give indications of the abnormal presentation of fetus which caused uterine torsion. This result was in agreement with Sutter et al. (2003), Riggs (2006) and kovavisarach and Vanitchanono (1999) who reported that malprsentation of fetus may cause uterine torsion. In this study, the fetal survival was little (12 fetus), this may be due to the late diagnosis of uterine torsion, so the early diagnosis of uterine torsion increased the maternal and fetal survival rate. The result is in agreement with Wheat and Meaghor (1972), Nigel et al. (1992) and Srinvas et al. (2007) who reported that the early diagnosis of uterine torsion saved the fetal and maternal life and maintained fertility. The other 14 fetuses died after operation due to emphysema because of introduction of bacteria to the uterus which invaded the dead fetus.

CONCLUSION

Caesarian operation in early diagnosed uterine torsion in buffaloes is the best method for saving fetal and maternal life.

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