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Prevalence of Fasciolosis and Hydatidosis in Male Cattle Slaughtered at Butajira Municipal Abattoir, Southern Ethiopia

Daniel Hussien, Fetku Kerala, Yohannes Hagos and Awot Teklu

Mekelle University, College of Veterinary Medicine, Mekelle, Ethiopia

Abstract: A cross sectional study was conducted from November 2013 to April 2014 in Butajira municipal abattoir to determine the prevalence of fasciolosis and hydatidosis and to identify the associated risk factors. A total of 1120 randomly selected male cattle were subjected to standard antemortem and postmortem examination. Chi-square statistic and univariate logistic regression were used to analyse the data. Out of 1120 cattle examined during antemortem inspection, 48(4.29%) were found to have various types of abnormalities. Lameness (1.88%), branding (1.16%) and local swelling (1.25%) were the major abnormalities indentified during antemortem examination. Out of the examined 1120 male cattle, 272(24.29%) were infected by liver fluke and 402 (35.89 %) were infected by hydatid cyst. The prevalence of fasciolosis was affected by age and body condition score of slaughtered animals ($p<0.05$). However, statistically significance difference was not observed between liver fluke infection and origin of slaughtered animals ($p>0.05$). The association between prevalence of hydatidosis and body condition score of animals was statistically significant ($p<0.05$). Nevertheless, hydatid cyst infection rate was not seemed to be affected by both age and origin of slaughtered animals ($p>0.05$). In conclusion, the study revealed the high prevalence of both fasciolosis and hydatidosis. Hence, appropriate control and prevention strategies should be established at all levels.

Key words: Abattoir · Butajira · Cattle · Fasciolosis · Hydatidosis · Prevalence

INTRODUCTION

The livestock sector in Ethiopia has substantial contribution to the economy; however, parasitic diseases including hydatidosis and fasciolosis cause a significant financial loss by lowering the productivity of cattle in addition to losses from condemnation of affected organs [1-4]. Moreover, these diseases are also known to cause public health problems as humans can be infected from accidental ingestion of parasite eggs/larvae passed into the environment with feces from definitive hosts [5-9]. Therefore, helminth control should receive special attention so as to utilize efficiently the huge cattle population of the country and to safeguard the population from infection by zoonotic parasites. Before contemplate on control programs, collection of baseline data is required. Therefore, the objectives of this study were to determine the prevalence of fasciolosis and hydatidosis and to identify the associated risk factors in male cattle slaughtered at Butajira municipal abattoir.

MATERIALS AND METHODS

Study Area: The study was conducted from November 2013 to April 2014 in Butajira municipality abattoir. Butajira is located about 130 km South of Addis Ababa. The study area is administratively located in Meskan district. The district is found in Guraghe Zone, Southern Nations Nationalities and Peoples (SNNP) Regional State of Ethiopia. Climate varies from arid dry lowland areas at altitudes around 1,500 m to cool mountainous areas up to 3,500 m above mean sea level. The main wet season occurs between June and October, with the remaining months predominantly dry. The average annual rainfall of the area is 945 mm and day-time temperatures are typically between 20-30°C, with night-time temperatures falling close to freezing at higher altitudes. The lowland areas are drought prone and have been affected during the main droughts in Ethiopia. The cattle population of Guraghe zone is about 306,992 male and 626,060 female cattle [10].

Corresponding Author: Daniel Hussien, Mekelle University, College of Veterinary Medicine, P.O.Box 231, Mekelle, Ethiopia.

Study Population: The study animals comprised male indigenous cattle presented for slaughter from different localities in the Butajira municipal abattoir. A total of 1120 randomly selected cattle were included in the present study.

Study Design and Data Collection: A cross-sectional study was conducted to determine the prevalence of fasciolosis and hydatidosis in cattle slaughtered at the abattoir. Simple random sampling technique was used to select study animals. The study involved antemortem and postmortem examinations. During antemortem inspection, age, origin and body condition score of each animal were recorded. The age of the animal was estimated based on the dentition formula and conventionally grouped into young and adult [11]. Body condition of the study animals was scored based on the criteria set by Richard [12], which ranged from 3 to 5 as there was no any animal slaughtered with body condition score 0-2. The origin of the study animals was determined during interviewee and grouped as from highland and lowland areas based on altitudinal differences. All animals included in the study were physically observed before or shortly prior to slaughter. Inspection of the animals was made while at rest or in motion for any obvious sign of disease. Postmortem examination involved examination of organs particularly livers, lungs, hearts and kidneys and through visual inspection, palpation and incision of suspected organs for the presence of liver fluke and hydatid cyst.

Data Analysis: The data was entered and managed in a Microsoft excel spreadsheet and analyzed using STATA-11.0. Descriptive statistics was used to summarize the data and expressed as frequency and percentage. Chi-square ($x2$) test was to determine the degree of association between different risk factors and the infection rates. Univariate logistic regression analysis was conducted to quantify the degree of association between risk factors and infection rates and expressed as odds ratio (OR) and 95% CI. A p-value of less than 0.05 was regarded as a cut-off point for statistically significant difference for all analyses.

RESULTS

Antemortem Examination: Out of 1120 cattle examined during antemortem inspection at Butajira municipal abattoir, various types of abnormalities were encountered in 48(4.29%) of the male cattle. The major abnormalities encountered were lameness (1.88%), branding (1.25%) and local swelling (1.16%) (Table 1). These animals were, nevertheless, passed for slaughter with caution through postmortem examination.

Postmortem Examination: All animals examined during antemortem inspection were also examined during postmortem examination. Liver fluke alone and together with hydatid cyst were detected in 20.36 and 3.93%, respectively, of the livers. Of the examined lungs, 23.04% showed hydatid cyst. The cyst was also recovered from heart (1.43%) and kidneys (0.80%) (Table 2).

As shown in Table 3, the overall prevalence of fasciolosis was 24.29% (272/1120). According to origin of slaughtered animals, slightly higher prevalence (26.44%) was observed in animals originated from lowland areas than highland areas (22.53%). Statistical significant difference, however, was not observed in animals according to origin ($x2$=2.3074; p=0.129). Age dependent study revealed that the prevalence of fasciolosis was 46.43% for young animals and 23.72% for adult animals. The difference was statistically significant ($x2$=7.6576; p=0.006). Young animals were found 2.79 times (OR=2.79; p=0.006) more likely to be at risk of acquiring fasciolosis than adult animals. Body condition score wise, prevalence rates of 19.27%, 40.93% and 15.06% were recorded in animals with body condition score 3, 4 and 5, respectively.

Table 1: Abnormal conditions encountered during antemortem inspection.

Abnormal conditions	No. affected animals	Abnormality Percentage
Lameness	21	1.88
Local swelling	13	1.16
Branding/bruising	14	1.25
Total	48	4.29

Table 2: Organ wise distribution of parasitic diseases in male cattle slaughtered at Butajira municipal abattoir

Organ	Parasitic diseases	Frequency (%)
Liver	Fasciolosis	228(20.36)
	Hydatidosis	85(7.59)
	Fasciolosis & Hydatidosis	44(3.93)
	Total	357(31.88)
Lungs	Hydatidosis	258(23.04)
	Total	258(23.04)
Heart	Hydatidosis	16(1.43)
	Total	16(1.43)
Kidneys	Hydatidosis	9(0.80)
	Total	9(0.80)

Table 3: Association of different risk factors with prevalence of fasciolosis at Butajira municipal abattoir

Variable	No. animal slaughtered	No. positive (%)	*x*2(p-value)	OR(95% CI)
Origin				
Highland	617	139(22.53)	2.3074(0.129)	-
Lowland	503	133(26.44)		-
Age				
Young	28	13(46.43)	7.6576 (0.006)	2.79(1.3092-5.9345)
Adult	1092	259(23.72)		1
Body condition score				
3	218	42(19.27)	82.7808(0.000)	1.35(0.8924-2.0313)
4	364	149(40.93)		3.91(2.8523-5.3599)
5	538	81(15.06)		1
Total	1120	272(24.29)		

1= reference category

Table 4: Association of different risk factors with prevalence of hydatidosis at Butajira municipal abattoir

Variable	No. animal slaughtered	No. positive (%)	*x*2(p-value)	OR(95% CI)
Origin				
Highland	617	231(37.44)		-
Lowland	503	171(34.00)	1.4277(0.232)	-
Age				
Young	28	13(46.43)		-
Adult	1092	389(35.62)	1.3854(0.23)	-
Body condition score				
3	218	85(38.99)		2.57(1.8235-3.6342)
4	364	210(57.69)	35.9739(0.000)	5.49(4.0825-7.3903)
5	538	107(19.89)		1
Total	1120	402(35.89)		

1= reference category

There was statistically significant difference in prevalence of fasciolosis among different body condition score categories (*x*2=82.7808; p=0.000). Animals with body condition score 3 were found 1.35 times (OR=1.35; p=0.000) more likely to be infected by *Fasciola* than animals with body condition score 5. Likewise, animals with body condition score 4 were 3.91 times (OR=3.91; p=0.000) more likely to be at risk of being infected by liver fluke than animals with body condition score 5.

The overall prevalence of hydatidosis was 35.89 % (402/1120). Origin wise analysis of prevalence of hydatidosis indicated that 37.44% for highland animals and 34.00% for lowland animals. The difference was not statistically significant (*x*2=1.4277; p=0.232). Age dependent study revealed that there was no statistically significant difference in prevalence of hydatidosis between young and adult animals (*x*2=1.3854; p=0.23). However, prevalence of hydatidosis was affected by body condition score of slaughtered animals (*x*2=82.7808; p=0.000). Animals with body condition score 3 were found 2.57 times (OR=2.57; p=0.000) more likely to be infected by hydatid cyst than animals with body condition score 5. Similarly, animals with body condition score 4 were 5.49 times (OR=5.49; p=0.000) more likely to be at risk of acquiring hydatidosis than animals with body condition score 5 (Table 4).

DISCUSSION

The overall prevalence of fasciolosis obtained in the current study was 24.29%. This finding was comparable with the prevalence of 24.32% reported in Mekelle municipal abattoir, Ethiopia [13] and 23.41% reported in Zaria abattoir, Nigeria [14]. However, the obtained prevalence was higher than the prevalence of 14.0% reported in Wolaita Soddo abattoir [15] and 14.04% reported in Hai town abattoir, Tanzania [16]. The overall prevalence of fasciolosis (24.29%) obtained in this study appeared to be lower than the prevalence of 90.65% reported in Gondar municipal and industrial abattoirs,

Ethiopia [17] and 53.9% in selected major abattoirs, Zambia [18]. Differences in prevalence of fasciolosis in different geographical locations might be attributed to variations in ecological, climatic and animal husbandry practices. Statistical analysis of the data showed that there was statistically significant ($p<0.05$) association between liver fluke infection and age of slaughtered animals. Young animals were found 2.79 times (OR=2.79; p=0.006) more likely to be at risk of acquiring fasciolosis than adult animals. There was a decrease in infection rate as age advances. This finding was in agreement with the report of Petros *et al*. [19] in Nekemte municipal abattoir, Ethiopia. This might be due to the fact that adult animals develop both humeral and cell-mediated immune response as a result of previous challenge. The high level of tissue reaction as a result of cell-mediated immune response would lead to liver fibrosis, which impeded the passage of immature flukes. Acquired thickening, stenosis and calcification of bile ducts assumed unfavorable site for adult parasites and consequently fasten their expulsion [19, 20]. The infection rate of cattle was also affected by body condition score. Animals with body condition score 3 were found 1.35 times (OR=1.35; p=0.000) more likely to be infected by *Fasciola* than animals with body condition score 5. Likewise, animals with body condition score 4 were 3.91 times (OR=3.91; p=0.000) more likely to be at risk of being infected by liver fluke than animals with body condition score 5. Similar lower prevalence of fasciolosis in animals with good body condition score was also reported by other workers [21, 22]. This could be attributed to the fact that animals with poor body condition are usually less resistant and are consequently susceptible to various diseases. The other possible reason for the lower prevalence of fasciolosis in animals with good body condition might be due to the fact that animals coming from feedlot are usually in good body condition and are most likely to be dewormed than cattle coming from grazing. Similarly, comparison was also made on the prevalence rate of fasciolosis based on altitudinal differences of animals' origin. However, there was no statistically significant difference between liver fluke infection in animals coming from lowland and highland areas. Similar finding was also reported by Bulcha *et al*. [1] in Gimbi municipal abattoir. This could be due to the similarity in the socio-economic status and animal husbandry practices of community in all areas from where animals were bought to slaughterhouse.

The overall prevalence of hydatidosis was 35.89% in the present study. This finding was in agreement with the prevalence of 34.05% in Bahir Dar abattoir, Ethiopia [23]. However, it was higher than the prevalence of 11.8% in Bako municipal abattoir, Ethiopia [24] and 19.4% in selected areas of northern Turkana, Kenya [25]. The current finding was lower than the prevalence of 52.69% in Hawassa municipal abattoir, Ethiopia [26] and 48.7% in Ngorongoro district of Arusha region, Tanzania [27]. These variations in prevalence of the diseases in different areas might be due to variation in the ecological and other factors like difference in culture, social activity, animal husbandry systems, backyard slaughtering of ruminants, lack of proper removal of offal and attitude to and number of stray dogs in different regions [28, 29]. Statistical analysis of the data showed that there was significant ($p<0.05$) difference in infection rate among different body condition score categories. Animals with body condition score 3 were found 2.57 times (OR=2.57; p=0.000) more likely to be infected by hydatid cyst than animals with body condition score 5. Similarly, animals with body condition score 4 were 5.49 times (OR=5.49; p=0.000) more likely to be at risk of acquiring hydatidosis than animals with body condition score 5. Similar lower prevalence of hydatidosis in animals with good body condition score was also reported by other workers [24, 30]. However, the infection rate by hydatid cyst was not affected by age and origin of slaughtered animals.

In conclusion, the present study indicated that fasciolosis and hydatidosis are important disease problems in cattle in the study area. The findings of the present investigation substantiate several earlier studies that hydatidosis and fasciolosis are endemic and widespread diseases in Ethiopia. Therefore, control strategies applicable to Ethiopia should be designed and implemented so as to minimize the economic losses incurred due to the diseases and to safeguard the public from these zoonotic parasites.

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