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Research Article

Study on Prevalence of *Toxocara vitulorum* in Bovine of Senkale Faris Peasant Association of Ambo Districts, West Shewa Zone, Ethiopia - ፩

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ABSTRACT

Toxocara vitulorum infection has been reported to have a cosmopolitan distribution in whole of the tropical and subtropical regions of the world with a moderate, continental climate. Parasitic diseases of dairy animals are a universal problem and considered one of the major obstacles in health and production performance of animals. Retarded growth, poor production of milk, meat, poor quality of skin and hides are known harmful effects of parasitic infections in bovines. This study was aimed to determine prevalence of *Toxocara vitulorum* in Ambo area Sankale faris peasant association in cattle of different Age and sex group. Across sectional study was conducted to investigate the prevalence of bovine ascariasis infection on 243 animals in Senkale Faris peasant association in Ambo district west Shewa zone. To achieve this; floatation techniques was employed. Based on this method about the overall prevalence was 243(63%) of which ages, and sex was a determinant factor *Toxocara vitulorum*. The known prevalence with age and sex category was <3 month, 122(68%), 3-6 month, 70(61%), 6 month 30(12.3%) and 1 year 21(8.6%) *p*-value 0.000, from this we can say age of cattle has highly significant on enhancing the disease. In conclusion the result of the present study has revealed that there is high prevalence of ascariasis in calves, hence, appropriate treatment, control and owner's awareness, should be implemented so that to increase the productivity of cattle's in the study area.

Keywords: Bovine ascariasis; Calves, Prevalence; Sankale faris peasant association

INTRODUCTION

Background of the study

The growing demand for meat and milk in developing world, changing functions of livestock and changing consumers perspectives are the major driving forces in the global livestock sector during the next two decades [1]. The movement of people from rural areas to urban centers will increase the demand for food of animal origin. Ethiopia has the largest livestock inventories in Africa, including more than 38 million cattle, 30 million small ruminants, more than one million camels and 4.5 million Equines and 40 million chickens with livestock ownership currently contributing to the lively hood of an estimated 80 percent of the rural population [2].

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 [3]. The animal production systems are extensive, semi-intensive and intensive in Ethiopia and have 53 million heads of cattle [4]. They serve as source of food, hides and important draught power for crop production. Cattle production, among the sector of livestock production systems, is a critical issue in Ethiopia. In spite of all this, full exploitation of cattle potential is mainly constrained and impeded at a great extent by parasitic diseases [5-7].

A number of parasitic, bacterial, fungal and viral diseases and nutritional deficiencies that are prevalent in Ethiopia affect the productivity of cattle [8]. Among this *Toxocara/Neoascaris vitulorum* is a large, creamy-white round worm up to 30 cm long and 5mm in diameter. *Toxocara vitulorum* is widely distributed, serious parasites of young cattle, especially in tropical countries where the climate is favorable. The prevalence of this parasite reported in bovine calves was over 30% [9].

Parasitic diseases of dairy animals are a universal problem and considered one of the major obstacles in health and production performance of animals. Retarded growth, poor production of milk, meat, poor quality of skin and hides are known harmful effects of parasitic infections in bovines [10].

Infections with Gastrointestinal (GI) nematode often cause outbreaks of disease and are a continual source of economic losses. *T. vitulorum* is one of the most common and dangerous intestinal parasites affecting buffalo calves in tropical and subtropical countries.

Buffalo is the major source of quality milk with unique feed conversion capacity in poor tropical countries. There is vast economic impact of *T. vitulorum* as it mostly affects buffalo calves. There is also an expanding trade in breeding stock and in frozen semen. *T. vitulorum* seriously affects buffalo calves of <3 months of age and this infection is generally recognized as an important limiting factor in calf rearing because of high morbidity, loss in production and disturbance in the breeding programmed. As per Standardized Nomenclature of Animal Parasitic Diseases (SNOAPAD) and [11] disease caused by *T. vitulorum* is known as toxocarosis. If it is not controlled in the field the prevalence can go even up to 100 per cent [12] and the mortality rate can be as high as 80 per cent [13].

T. vitulorum is widespread, but the prevalence is strongly related to climatic conditions. In countries with a hot and humid climate, such as the (sub) tropics, the prevalence is significantly higher than in countries with a cold and dry climate [14]. The prevalence rate of this parasite is governed by species, sex, age and seasonal variation. Prevalence rate is higher in buffalo calves compared with bovine calves, in female animals compared with male animals and in the monsoon compared with summer.

Experimentally it has been found to infect rabbits [15] mice [16] and also to rats, guinea pigs and chicken. There is no evidence yet that infective eggs of *T. vitulorum* can infect humans but the larvae from these eggs migrate in paratenic hosts and the possibility of migration in humans has been suggested. Within the paratenic host, *T. canis* larvae can migrate widely including the liver, musculature and the central nervous system, causing the well-characterized syndrome of Visceral Larva Migrants (VLM) [17]. The propensity to invade the brain and the eye has given rise to particular concern in the human population, with Ocular Toxocariasis (OT) a recognised [18], and Neurotoxocariasis (NT) inferred from cognitive deficits, higher prevalence among epilepsy cases [19], and finding larvae in post-mortem brain samples [20]. Current options for treatment of humans infected with tissue-dwelling larvae are of uncertain efficacy because of the covert nature of the infection and the incomplete resolution of symptoms [21]. An adult female *T. vitulorum* produces thousands of eggs daily. Egg production ranges from 8000 to as high as 100,000 Eggs per Gram (EPG) of faeces per day. These eggs are passed out in the faeces and under favorable conditions of adequate moisture and warm temperature become infective in 2-3 weeks. A thick protective shell provides resistance against adverse environmental conditions such as chemical and physical factors, enabling eggs to remain alive for many years. Consequently, infective eggs which are abundant

on pastures and other places that are contaminated with calf faeces are major source of infection to the other animals. The extra host development of *T. vitulorum* is typical of nematodes in general. Development to L3 requires adequate moisture and temperature in the range of 20-30°C.

Pathogenicity caused by *T. vitulorum* infection in young calves is seen mainly in the form of diarrhea and steatorrhea. This is accompanied by inappetence, intermittent colic, tympany, occasional dysentery, anorexia, constipation, dehydration, abdominal pain, butyric odor in breath, loss of weight, loss of plasma proteins in to the intestine, loss of 12 glossiness and skin tone with eczema signs resembling intestinal obstruction, presence of mud colored foul smelling feces, prominent ribs, unthriftiness and recumbence [22,23]. The pathogenesis of infection can be more serious and deaths can frequently be observed when associated with poor nutritional status.

T. vitulorum infection can be diagnosed on the basis of clinical signs, necropsy findings, fecal examination for eggs and serological tests. Carpalogical examination techniques fail to detect infections in adults and also during the prepatent stage and in mild infections in young calves. It is clear from the life-cycle studies that mother is the principal source of infection to calves through milk therefore; detection of the parasite in immature larval stages in the dam is of paramount importance for control of toxocarosis in calves. Hence, for this purpose it is necessary to resort to immunodiagnostic techniques for early and accurate diagnosis.

Statement of problem

Little information is available on prevalence and diagnosis of toxocarosis in calves in Ambo districts was specific disease called *T. vitulorum* in which the study done before was major parasitic problems which is broad, while, changing animal husbandry practices have aggravated the worm situation in cattle [24-26]. Hence, the most need of the hour is to generate a base line data regarding the prevalence of the parasite. This would help in assessing the impact of this parasite on the livestock industry.

Objective of the study

General objective

- To determine prevalence of *T. vitulorum* in Ambo area Sankale faris peasant association in cattle of different Age and sex group.

Specific objectives

- To determine the prevalence of *T. vitulorum* parasite in cattle in different sex and age group in the study area.
- To diagnosis the *T. vitulorum* from the study population
- To assess the predisposing factors of *T. vitulorum* in the cattle
- Assessing the attitude, knowledge and awareness of owners on the prior information needed for the treatments.

Research question

- What was the prevalence of *T. vitulorum* in the area?
- What type of *Ascaris spp.* was prevalent in the area?
- What are the factors responsible to predispose the *T. vitulorum*?

REVIEW OF LITERATURE

Etiology of the Disease

Calf ascariasis due to *T. vitulorum* is considered to be a major limiting factor in organized farms, due to high morbidity, mortality, loss of production and ineffective implementation of breeding programmed [27]. *T. vitulorum* is among the most destructive parasites of calves, the larvae of which undergo migration causing great damage to many organs, especially the liver and the intestine. It is responsible for up to 50% mortality in cattle and buffalo calves [28] it means without control the disease should reach up to 80% mortality rate and is mainly transmitted through transplacental and transmammary transmission, causing the disease characterized by severe anemia, diarrhoea, weight loss and anorexia, particularly in buffalo calves between 1 and 3 months of age [29].

[30] recognized this disease in calves as the top most cause of morbidity and mortality. The present communication reports *T. vitulorum* in a crossbred Jersey calf and its successful treatment with 30 ml suspension of 1.5% fenbendazole + 0.5 % praziquantel orally.

Clinical Sign

Heavy infection are associated with poor thriving and intermittent diarrhea, and in buffalo, calf mortality may occur. Animals became dull and depressed growth became poor and loses. Generally, infection with *T. vitulorum* is frequently manifested by diarrhea, poor performance, and poor growth rate, but high morbidity and mortality in buffalo calves, particularly in calves aged 15 to 50 days, were recorded [31]. Major Clinical signs that have been reported in naturally infected calves with *T. Vitulorum* include anorexia, signs of abdominal pain, diarrhea of varying severity, constipation, dehydration, steatorrhea, unthriftiness, weight loss or poor weight gain, poor hair coat, and a butyric odor on the breath.

Epidemiology

The most important feature is the reservoir of larvae in the tissue of cow, with subsequent milk born transmission insuring that calves are exposed to infection from the first days of life. The eggs are very resistant to cold and survive most readily cool, moist surroundings *T. vitulorum* is an important cause of mortality in buffalo calves in India and South East Asia [32].

Diagnosis

The diagnosis and control of *T. vitulorum* is not easy as the larvae migrate in the tissues, remaining as dormant or hypobiotic parasites. It is mainly transmitted through colostrum and milk, causing disease (severe anemia, diarrhea, weight loss and anorexia) particularly in buffalo calves [33]. This parasite is of great problem of bovine and buffalo calves, particularly from poor tropical countries. Humans become infected by ingestion of infective eggs either from soil, dirty hands, raw fruits and vegetables or larvae from undercooked meat and unpasteurized milk [34]. Larval migration through different soft tissues in the human generates several clinical entities in the patient, such as visceral larva migrants, ocular toxocarosis, and neurotoxocarosis [35].

Accordingly, the present study was aimed to investigate infection by *T. vitulorum* in buffaloes and their newly born calves during their first few months of life. The anti *T. vitulorum* antibodies present in the sera and milk of infected buffaloes is evaluated by comparison with the level of parasite eggs in their feces. In addition, the alteration in eosinophil counts was investigated at different times of infection.

[36] Indicated that a rapid decline of fecal EPG counts with the decrease of antibodies level in the serum of the calves after 6 weeks of age. This result suggests the expulsion of adult worms from the intestine and toxocariasis is self-cure process. It is found that eosinophils release mediators that could attack nematode cuticle in the lumen of calf infection [37].

Zoonotic potential of *Toxocara vitulorum* at L3

Toxocariasis is a highly prevalent zoonotic parasitic infection world-wide that affects dogs and cats as well as cattle and water buffaloes. It is caused primarily by *T. canis*, in addition to *T. cati*, *T. vitulorum* and *T. leonina*. Both of these are ascarid nematodes in the order Ascaridida, superfamily Ascaridiodea, and family Anisakidae. Their definitive hosts are the domestic dog, cat, cattle and buffaloes in which they live as adults within the lumen of the small intestine. Dogs constitute a vast reservoir of *T. canis* worldwide, although two other species, *T. cati* and *T. vitulorum* are also possible causes of the disease [38].

Larval migration through soft tissues in the humans generates several clinical entities in the patient such as Visceral Larval Migrans (VLM), Ocular Larval Migrans (OLM) and neurotoxocariasis. VLM is primarily the disease of children who are more likely to ingest eggs of *Toxocara* species. Generally human become infected by ingestion of embryonated eggs either from soil, dirty hands, raw fruits and vegetables or larvae from under cooked meat of paramedic hosts and unpasteurized milk [5]. Today, the public health community at-large acknowledges that toxocariasis in all its clinical forms constitutes a major health risk, especially among children exhibiting pica [39].

Prevalence of *Toxocara vitulorum*

Prevalence of helminthes parasites in cattle of many African countries including Ethiopia is found to be high. For instance, [40] and [41] reported 82.2 and 50.2% in Central Ethiopia and Western Oromia, respectively. In Tanzania, [42] obtained prevalence of 44.4 and 37% for large and small scale dairy cattle, respectively.

Prevention and control

In cattle, ascarid infestations by *T. vitulorum* are endemic in regions with a tropical and subtropical climate [25]. Animals allowed to hunt or eat raw tissues have a higher risk of becoming infected. Because patent infections with *T. vitulorum* occur only in 3- to 10-week-old calves, anthelmintic treatments in ruminants are targeted to young animals. A single dose of anthelmintic, given when calves are 14-21 days old, can control *T. vitulorum* and reduce environmental contamination with eggs. Other regimens, which may include multiple treatments, have also been described. Prompt elimination of feces can help reduce environmental contamination. The elimination of this infection would be a highly desirable goal [8]. Killing *Toxocara* eggs in contaminated soils nearly impossible task, but if such a strategy could be found and safely implemented, vast numbers of acres of now potentially dangerous city landscape could be rendered *Toxocara*-free [4].

MATERIALS AND METHODS

Study area

The study was under taken in Ambo area of Senkale faris peasant association of west Shewa Zone, Oromi a regional states, located 114 km west of Addis ababa .The area is found at longitude of 32°E, to 3803'E and latitude 8°47'N to 9°21'N. The altitude range of the area is

1900 to 2275 above sea level. The climatic condition of the area is 22% high land, 60% mild altitude, and 17% low land. The annual rainfall and temperature ranges from 300-1000m and 20°C-29°C respectively. The rain fall is bimodal with short rainy season from February to May and long season from June to September as Ambo agriculture and rural development bureau technical report 2006.

Study animals

Animals that were included in this study are bovine at different age and sex category found under the extensive grazing systems. Fecal samples were sourced from bovine calf proposed from Ambo district, west Shewa Zone of Senkale peasant association. The source of each individual bovine calves with different ages was identified using physical examination of the cattle.

Study design

A cross sectional study type was implemented from October 2016 to May 2017 in order to estimate the prevalence of bovine ascariasis in herds located in the study area. The study was carried out by direct clinical examination of the of the study population. These animals for this investigation were calves randomly selected from sankale faris peasant association. In these area calves of all ages, local breed and both sex were considered.

Sample size and sampling method

The sample size required for the study was determined by using formula for simple random sampling techniques. Accordingly the total of 384 animals were selected from the study population because the expected prevalence in the area were not known before, in this case we will use 50% of the prevalence The sample size was determined by using the formula given by Thru field (2007), 95%confidence interval and absolute precision (0.5%).

$$n = 1.962P_{exp} (1-exp) d^2$$

Where

n = total sample size,

P_{exp} = expected prevalence (50%)

d = absoluteprecision (0.5%). Accordingly, the minimum sample size needed to estimate district level was384.

Sample collection

Fecal sample were collected directly from the rectum of the study animals using disposable plastic gloves and placed in plastic fecal bags that were labeled. The sample were brought to laboratory technology, Ambo University and processed in same day of collection. During sampling date, age, sex, and etc. factors were considered for each sampled animals.

Parasitic examination

All fecal samples collected were examined individually for bovine *T. vitulorum* eggs using the simple floatation techniques in the laboratory to detect parasitic eggs in fecal samples of cattle, the samples were examined by floatation and sedimentation techniques [39]. The floatation fluid used for the study was 37% Sodium chloride solution (saturated solution). Three grams of feces of each individual animal was mixed in 42 ml of salt solution and filtered using Sieve and completely filled to test tube to make meniscus discus with no air bubble between the slide or cover slip glass and salt solution. Next, the test tube was allowed to stand for 20 minutes. Finally the cover



slip was taken from the test tube vertically and placed on the slide and examined under lower objective microscope.

RESULTS AND DISCUSSION

Laboratory result

Prevalence of *T. vitulorum* in calves: The result of laboratory fecal examination for *T. vitulorum* is presented in the table 1 from the total 384 sampled animals examined by simple floatation techniques, 243 animals were found to be infected with *T. vitulorum*. The prevalence of which was 63%. There was high significance difference between age and no significance difference with sex (Table 2).

Table 1: Over all prevalence representation based on age and sex.

Ages of calves	No of examined	No of positive	No of negative	Prevalence
<3 month	179	122	57	68%
3-6 month	115	70	45	61%
6month 1 year	90	51	39	56.6%
Total	384	243	141	
Sex				
Male	218	141	77	64%
Female	166	102	64	62%
Total	384	243	141	

Table 2: Chi-square tests of age and sex result.

Variable	No of cattle examined	X ²	P-value	
Age	<3 month	179	13.318 ^a	.000
	3-6 month	115		
	6 month	40		
	1 year	50		
Sex	Male	218	2.186 ^a	0.335
	Female	166		
Total	384			

X² = chi-square P-value

Discussion

In table 1 above result the overall prevalence of the infection observed by laboratory work by different age group and sex in this present study was similar with [22], revealed that 243(63%) of calves were infected by *T. vitulorum* in the study area and also the prevalence by the age category was <3 month 122(68%), 3-6 month 70(61%), 6 month 30(12.3%) and 1 year 21(8.6%) with the *p*-value <.000 which was highly significant. Additionally sex was one of the predictable variable in enhancing such kind of parasitic disease in which the recorded prevalence was male 141(64%) and female 102(62%) with *p*-value >.335 which is not significant as indicated in result part above all the ages category were associated with disease. Because of that the climate of Ambo area sankale Faris peasant association is more moderate for multiplication, survival and development of *T. vitulorum*. The prevalence of *T. vitulorum* infection is higher in the calves of less than three month, and the difference was found statistically significant. This can be attributed due to the probability at risk to infection is high in young than adult. According to this study the prevalence of *T. vitulorum* by sex has no difference and also it was not statistically significant.

CONCLUSIONS AND RECOMMENDATIONS

Prevalence of helminthes parasites in cattle of many African countries including Ethiopia is found to be high. For instance, one study conducted by [42] and [43] documented 82.2 and 50.2% in Central Ethiopia and Western Oromia, respectively. Additionally the present study was similar with study or with the report of the authors from this we can conclude that without effective control the morbidity rate with *T. vitulorum* is high.

Toxocariasis is a highly prevalent zoonotic parasitic infection world-wide that affects dogs and cats as well as cattle and water buffaloes. A wide range of animals, including mice, rabbits, monkeys and humans, act as paratenic hosts. It is caused primarily by *Toxocara canis*, in addition to *T. cati*, *T. vitulorum* and *T. lemonina*. Therefore, the study recorded that there is high prevalence of *T. vitulorum* in bovine calves in the study area on the basis of simple floatation techniques including some factors enhance the disease in the area.

The prevalence of *T. vitulorum* in most countries is between 5-50 per cent. In present study the overall prevalence of this study was 63% and the prevalence rate of this parasite is governed by species, sex, age and seasonal variation. Prevalence rate is higher in buffalo calves compared with bovine calves, in female animals compared with male animals and in the monsoon compared with summer. Here the risk factors like age category has been found statistically significant with the identification of *T. vitulorum*, while sex was not statistically significant.

Therefore, based on the above finding the following conclusive remarks were recommended.

- Awareness creation of the owners and animal health professionals should conducted on the economic impact and control of the parasite.
- Anthelmintic drugs has to be given to all bovine calves up to 3 month age and the curative drug for the infected calves depending Manufactories manual and laboratory diagnosis.
- Further studies with large numbers of calves should be conducted to determine about the epidemiology of the disease in the study area.
- Based on the season the style of management, treatment and husbandry practice should be investigated.

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