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Prevalence, Intensity and Risk factors Associated with Helminthic Infestation in donkeys in and around Hawassa town.

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Abstract

A cross sectional study was conducted from November 2016 to April 2017 in and around Hawassa town to estimate the prevalence of donkeys gastrointestinal helminthes parasites and the associated risk factors and to assess the infection level also undertaken to identify the genera of parasites prevailing in the study areas. A total of 420 faecal samples systematically collected from donkeys, and examined through floatation, mc master egg counting techniques. The overall prevalence of gastrointestinal helminthes parasites observed during this study was (82.6%). During the study period, the individual prevalence of Strongyle, Parascaris equorum and Oxyuris equi was (72.6%), (4.5%), (0.3%) identified and also the mixed infection observed between strongyle and Parascaris equorum (17%); and strongyle and Oxyuris equi (0.6%) infection respectively. The copro-culture examination revealed the dominance of strongylus Spp.(62%), followed by (14.1%) Triodontophorus spp., (7.6%) Oesophagodontus spp. (13%) Cyathostomes and (3.3%) strongloides species. The Sex, Age, Body conditions score, Deworming history and Fecal consistency were considered as putative factors but only deworming history and Age of the animals significantly associated to the infection (P <0.05). The overall mean egg count revealed 626.8 EPG, with majority of the donkeys in the study area were suffered from light infection (44%). In conclusion, the current study revealed higher prevalence of GIT helminthes infection in donkeys in the study area. Therefore, in order to reduce the prevalence regular deworming, improvement of feeding and management systems and awareness creation to animal owners was recommended.

Keywords: Prevalence, Intensity, Risk factor, Donkey.

1. Introduction

Equids (donkeys, mules and horses) play an important role as working animals in many parts of the world, and have a prominent position in the agricultural systems of many developing countries. The equine population of the world is about 98.3 million(40 million donkeys, 15 million mules and 43.3 million horses). In the distribution pattern, 98% of all donkeys, 97 % of all mules, and 60% of all horses are found in developing countries (Takele and Nibret, 2013).

Ethiopia is the home of about 6.75million donkeys being the second largest donkey population in the world next to China, 0.35 million mules and 1.91 million horses (Mezgebu *et al*., 2013),which is widely distributed throughout Ethiopia. They play an important role in the transportation of farm products, fodder, fuel wood, agricultural inputs and construction and useful for both a rural and urban transport system, which is cheap and viable. It provides the best alternative in places where the good network is insufficiently developed, other terrains gagged and

mountains and cites where narrow streets prevent easy delivery of merchandise (Naramo *et al.*, 2016).Donkeys have reduced the domestic burden of rural people, especially women, and have created employment and income generating opportunities for many people (Adam *et al*., 2013).

Although equines are often described as hardy and resistant animals; they do suffer from a number of health problems (Takele and Nibret, 2013).Like other domesticated animals they are vulnerable to parasitic, bacterial, fungal, and viral disease. Parasites are some of the important causes of reducing the donkey ability to work and sometimes lead to animal loss. The donkeys are animals which suffer from parasites for a long time without getting adversely affected except for their getting weak (Najat, 2006).Internal parasites continue to be a significant threat to the health of equines. Internal parasites of equines are of veterinary importance in many countries (Disassa *et al.*, 2015).Among these internal parasites, GIT helminthes are one of the most common factors that constrain the health and welfare of donkeys worldwide (Gebreyohans *et al*., 2017). In Ethiopia including many other African countries, helminthes being an important depending on the species, nutritional and the immune status of equines. They decrease the performance and productivity in the animals mainly, in the reduction of body weight or failure to gain weight and cause loss through lowered fertility, reduced work capacity and increased treatment cost or even increase the mortality in acute case (Enigidaw *et al.,* 2015).

Equine endoparasites may be divided into three categories: nematodes (or roundworms), Cestodes (or Tapeworms) and Trematodes (or flukes). Parasites are assigned to these categories according to their morphology, or structure. Growth and life cycles of parasites within each group are generally distinct from those of the other groups. The roundworms are by far the most economically important internal parasites of equines (Disassa*et al.,* 2015). Strongyle nematodes of equines are classified in two subfamilies which are Strongylidea and Cyathostominea and are categorized as large and small Strongyles, respectively. Large Strongylespecies are most devastating and harmful parasites of equines due to their migratory habit and also they can be seen in all age groups of equines except in very young foals which have not started grazing. This genus composed of theimportant species namely*: S. vulgaris, S. edentatus and S. equines* (Wubie and Getaneh, 2015),which migrate extensively through the body, and others like *Triodontophorus spp.* and *Oesophagodontus robustus* do not migrate.The disease process caused by strongyles can be produced by migrating larvae and by adult worms. Larval of *Strongylus vulgaris* are the most pathogenic, causing arthritis, thrombosis and thickening of artery wall. The cyathostomins comprise more than 40 non-migratory species belonging to genera including Cylicostephanus, Cyathostomum, Cylicocyclus, Cylicodontophorus, Poteriostomum, Gyalocephalus, and Cylindropharynx. Of these, about 10 species occur commonly (Hailu and Ashenafi, 2013).

Many factors are known to influence the transmission and prevalence of gastrointestinal infection in grazing animals. Broadly the three influencing factors that can determine the occurrence of gastrointestinal tract infection could be mentioned as environmental host interaction, environmental parasitic interaction and host parasitic interaction. The development and survival of helminthes egg of larvae with faces and on pasture are depending on temperature and moisture thus forming suitable environment for development of larvae of nematode and trematode to infected stage. Inadequate quality of water stored in the dam from which livestock area using directly for drink may also form suitable way for transmission of cestoda and coccidian(Belete and Derso, 2015).

However various studies suggestedthe status of gastrointestinal helminthes infection and health hazard in donkeys in different locations of the country (Asefa *et al.*, 2011; Ayele *et al.*, 2006).Despite these comprehensive surveys of the prevalence and distribution of different helminthes species, there was not enough information is available on helminthosis and the effect of parasitism regarding to different variables.However, information specifically on the intensity of infection and its associated risk factors scarce, and that is why this study initiated.

Therefore; the main goal of this study was toestimate the prevalence of donkey gastrointestinal parasites in and around Hawassa;to assess the infection level and the risk factors associated and to identify the genera of parasites prevailing in the study areas.

2. Materials and Methods

2.1. Description of the study area

The study was conducted in Hawassa in southern Ethiopia situated 275 km south of Addis Ababaat a latitude of 7°04'N and a longitude 38°31'E on the escarpment of the Great Rift Valley. The altitude ranges from 1650 to 1700 m above sea level. The mean annual rainfall and temperature are 900-1100 mm and 27°C, respectively. The population of donkey (*Equus asinus*), mule (*Equus hemonious*) and horse (*Equuss cabalis*) in Hawassa town are 13961, 369, 5161, respectively (CSA), 2009.

2.2. Study design and study animals

A cross sectional study was conducted from November 2016 to April 2017, in donkeys selected by systematic random sampling technique to estimate the prevalence. The study assessed the intensity of infection; and risk factors associated with gastrointestinal helminthes infections and the study animals were selected from working donkeys in and around Hawassa town. Information about sex, age, body conditions, deworming(treatment) history, fecal consistency and feeding system of the study animals was recorded carefully. The donkeys were categorized into age groups according to owner's information and dentition characteristics as described by Svendsen (1997), accordingly ≤3 years,4-8 years and ≥8years, and these age classifications were based on the work of (Ayele *et al.*,2006andYoseph*et al.*, 2001)their body condition also characterized according to Svendsen(2008) as good, medium and poor body condition scores.

2.3. Sample size and sample size determination

Systematic random sampling technique was usedto select the study donkeys. The number of donkeys required for the study calculated by taking in to consideration expected prevalence of 50%, 95% confidence interval and 5% desired absolute precision. The total number of animals required for the study was computed based on the formula given by Thrusfield (2005).Therefore, for this study a total of 420 donkeys were selected.

2.4. Study methodology

2.4.1. Qualitative and quantitative examination of faecal sample

Faecal samples collected directly from the rectum of the study animals using disposable plastic gloves and placed in universal bottles. Collected samples were labeled with all necessary information i.e. the animal number corresponding to owner's name, date, age, sex, body condition, work type, anthelmintic treatment (deworming) history. Then it was immediately transported to Hawassa University Veterinary Parasitology Laboratory. Samples were kept in refrigerator at 4°C when immediate processing was not possible. Faecal examination was carried out by direct smear in order to detect some parasite larvae and simple floatation technique andexamined microscopically (10X and 40X) for presence of parasite ova following the procedure described by Urquhart *et al*. (1996)and MAFF (1979).

To assess the level of infection modified McMaster egg counting technique was applied as described by MAFF (1979). All parasitic eggs within the engraved area of both chambers were counted and the number of eggs per gram of faeces(EPG) was calculated by adding the egg counts of the two chambers together and then multiplied the total by 50.The level of worm infection was determined by using the infection severity index defined by Soulsby (1982) whereby the infection level in eggs per gram between 0-500, implies light infection; 500-1000, lies on moderate infection and >1000 implies the severity of infection.

2.4.2. Faecal culture and identification of recovered larvae

For identification of parasites to species level positive faecal samples were cultured and the larvae were recovered using Modified Bearman technique. The larvae recovered were identified based on their morphological characteristics as described in MAAF(1997),Kornas *et al* (2009), (Răileanu *et al.*,2008), and Bevilaqua (1993). So that the larvae's categorized into their genus level and species according to their morphological characteristics.

2.5 Data management and analysis

The data collected were entered into Microsoft Excel spread sheets and the data then coded, summarized by descriptive statistics like mean. The coded data were analyzed by using SPSS version 20 statistical software's. Chi-square tests was also applied to test the statistical association that can exists among the risk factors such as age, sex, deworming history and body condition scoring with the presence of the parasite..

3. Results

3.1 Coproscopic prevalence of helminthes infection

From 420 examined faecal samples of donkeys351 (83.6%) of them were found infected by helminthes parasites. Of the total 351 positive animals 262 (74.6%) accounted for strongyle type eggs (Table 1).There also single infection with *Parascaris equorum*, 16 (4.5%) and *Oxyuris equi* 11(3%) observed. The remaining infections accounted for mixed infection with Strongyle and Parascaris 60(17%) and Strongyle and Oxyuris infection 2(0.6%) as shown in (Table 1).

Table 1. Coproscopic prevalence of helminth infection in donkeys

Egg type	No examined	No positive	Prevalence (%)
Strongyle type	420	262	74.6
Parascaris equorum	420	16	4.5
Oxyuris equi	420	11	3
Strongyle and parascaris	420	60	17
Strongyle and Oxyuris	420	2	0.6
Total		351	83.6

3.2 Association betweenhelminthes infection and various risk factors

During this study sex, age, body condition score, deworming history and faecal consistency were considered as putative risk factors. The prevalence and analysis for the risk factors were shown on Table 2). Among the risk factors considered for this study only age and deworming history showed significant differences (P <0.05). from 387 males and 33 females examined 322(83%) males and 29(88%) females were observed positive with their respective individual prevalence, and with non-significant(P>0.05). In relation to BCS, from 262 donkeys with good score 222(85%) were positive, from 117 animals with medium score 93(80%) were found positive, and from 41 donkeys with poor score about 36(88%) were identified positive for the infection with non-significance association (P>0.05).In treatment(deworming) history related examination, from 66 donkeys examined with previous treatment history 39(59%) were positive and from those 354 donkeys which were never treated, 312(88%) were positive for helminthes infections with the observed significant (P=0.000). In relation to consistency of faeces, from 287 donkeys with normal faeces, 236(82%) were found positive and from 133 animals with soft to diarrheic faeces 115(87%) were identified positive with non-significant prevalence(P>0.05).The age related assessment suggested that, among 70 donkeys those grouped as ≤3 year interval 58 (82.8%) were identified positive, and from 283 animals under categories between 4-8 years 244 (86.2) were positive for infection and from 67 donkeys categorized in age group ≥8 about 49 (73.1) were found positive for the infection with significant association (P<0.05) as indicated from (Table 2).All risk factors were not significantly affecting the prevalence of helminthes infection in donkeys except age category and deworming history. The results for all considered risk factors are shown in table 2.

Table 2. Prevalence of helminthes infection vs. the risk factors considered for the study

Variables	Items	No. examined	No. positive (%)	S.E	95% CI	X^2	(P-value)
Sex	- Male	387	322 (83.2)	0.02	79.5-86.9	0.48	0.487
	- Female	33	29 (87.9)	0.06	76.5-99.2		
BCS	* Good	262	222 (84.7)	0.02	80.4-89.1		
	* Medium	117	93 (79.5)	0.04	72.1-86.9	2.21	0.331
	* Poor	41	36 (87.8)	0.05	77.6-98.0		
Age	- ≤ 3	70	58 (82.8)	0.04	73.9-91.7	6.78	0.034
	- 4-8	283	244 (86.2)	0.02	82.2-90.2		
	- ≥ 8	67	49 (73.1)	0.05	62.4-83.8		
Deworming history	*Treated	66	39 (59.1)	0.06	47.1-71.1	34.18	0.000
	*Nottreated	354	312 (88.1)	0.02	84.8-91.5		
Faecal consistency	-Normal	287	236 (82.2)	0.02	77.8-86.7	1.19	0.27
	-Soft	133	115 (86.5)	0.03	80.6-92.3		

3.2. Quantitative examination

The eggs per gram of faeces of those donkeys positive for helminthes infection in qualitative examinationcomputed for each risk factor considered for this study. The overall mean EPG of the study animals was 627.8 (Table 3). The mean EPG between sex groups indicated the difference in average EPG where 628.4 in males and 603.4 in females respectively. In relation to body condition score the donkeys with poor body condition score infected higher 654.2 than those with medium body condition score 629 and good body condition 620.7. The result of treatment history based identification revealed the mean EPG of 623.9 and671.8 between treated and non-treated respectively. The relation between fecal consistency and EPG indicated that the mean shedding of ova by donkeys having normal faeces(627.5) and that of donkeys having soft fecal consistency which (623.4).The result of age related comparison of EPG indicated the mean EPG of 674.1,625.6 and 573.5 in age group ≤3, 4-8 and ≥ 8, respectively as indicated in table 3.

Table 3. The comparison of mean EPG between different variables

Variables		No positive	Mean EPG	S.E	95% CI
Sex	- Male	322	628.4	21.93	585.3-671.6
	- Female	29	603.4	72.72	454.5-752.4
BCS	- Good	222	620.7	25.9	569.7-671.7
	- Medium	93	629	40.1	549.4-708.6
	- Poor	36	654.2	76.7	498.5-809.8
Age	• ≤3	58	674.1	56.15	561.7-786.6
	• 4-8	244	625.6	24.4	577.4-673.8
	• ≥ 8	49	573.5	57.8	457.1-689.8
Deworming history	- Treated	39	623.9	67.4	535.3-808.3
	- Not treated	312	671.8	22	577.3-664.1
Faecal consistency	- Normal	236	627.5	26.2	576.0-679.1
	- Soft	115	623.9	34.9	554.7-693.2
Overall		351	627.8	21.1	586.4-669.2

Among those animals positive for gastrointestinal helminthesova 156(44%),134 (38.2%) and 61(17.4%) were affected by mild, moderate and heavy infections, respectively(Table 4).

Table 4. Level of helminthes infection based on general helminthes eggs count .

Infection level	No positive	Percentage (%)	Mean	S.E	95% CI
Light	156	44	284.49	12.00	261.2-308.7
Moderate	134	38.2	732.1	12.02	708.3-755-.9
Heavy	61	17.4	1267.2	29.6	1207-1326.6
Total	351	100	627.8	20.6	585.1-667.6

3.3Result of faecal culture

From donkeys infected by helminthes faecal samples, 105 animals pooled and cultured and fivegenera of larvae were recovered. About 92 larvae were recovered and identified. Among the identified larvae species *Strongylus* species (62.0%) was the most frequently identified (Table 4), andother genera *Triodontophorus* spp. (14.1%),*Oesophagodontus* species (7.6%), *Cyathostomes* species (13%) and *Strongloide* type (3.3%) species also involved (Table 5).

Table 5. Relative percentage of larvae recovered from faecal culture

Parasites genera	Frequency	Percentage
Strongylus spp	57	62.0
Triodontophorus spp.	13	14.1
Oesophagodontus species	7	7.6
Cyathostomes species	12	13.0
Strongloide type	3	3.3
Total	92	100

4. Discussion

This study identified the helminthes species involved in the infection in donkeys in the study area which can be categorized about more than seven genera. The overall prevalence of helminthes infection in the study area was found to be 83.6%. The current finding of overall prevalence agree with the findings of Gebreyohans *et al*, (2017) who reported 80.2% around Mekelle, Enigidaw *et al*, (2015) who reported 86.5% in and around Kombolcha, Takele and Nibret, (2013), who reported 88.21% around Bahir-Dar town; and less than those reported, 93.75%, Tsegaye and Chala (2015), 99.5% by Zerihun *et al*. (2009), 98.2% report by Mulate (2005), and 96.9% by Nuraddis *et al*.(2011) in and around Gondar, Arsi-Bale areas, South and North Wollo provinces and in and around Hawassa, respectively. The difference among these findings from different areas might be due to variation in sample size and sampling method differences Mezgebu *et al*.,(2013). This Variation could also be due to variation in agro ecology and management practices, topography, climate, animal working conditions and seasonality. The relatively lowered prevalence in the study area might also be due to different management practices undertaken by owners, and might also due to the collaborated action of government and owner's perception on the use of deworming and anthelmintic therapy practice.

The result of this study identified that in the study area majority of donkeys were affected with Strongyle infection (74.6%) and to less extent the infections with Ascarids (*Parascaris equorum* 4.5%) and *Oxyuris equi* (3%) also identified. The mixed infections between Strongyles and *Parascaris equorum* (17%) and Strongyles and *Oxyuris equi* (0.6%) also seen during the investigation period. This showed that strongyle nematodes were significantly higher and the major causes of infection than the other identified helminth species. This finding is in a general agreement with the reports of Tsegaye and Chala (2015), and Regassaand Yimer (2013) who reported the highest relative proportion of Strongyle infection, followed by *Parascaris equorum*, *Oxyuris equi* and mixed infections. This probably due to Strongyle has large numbers of genera and species so their percent usually increased to that of whole nematodes infections (Mezgebu*et al.,* 2013).Gastrointestinal parasites are the most serious health problem of donkeys in Africa, contributing to poor body condition, reduced power output, poor reproductive performance and short lifespan(Adam *et al*., 2013). Higher prevalence of Strongyle infections corresponds also due to the biology and epidemiology of these parasites as they require longer period to complete their life cycle and significant change in worm population and their burden under different anthelmintic pressures over years.

The prevalence of single infection with *Parascaris equorum* in the current study (4.5%) was comparable with Regassa and Yimer (2013) who have reported 10.4% in south Wollo zone and Gebreyohans *et al.* (2017) who reported 6.4% in and around Mekelle. The current finding was not in agreement with Ayele *et al*., (2006) and Mulate (2005), who have reported 50% and 48.8% in Dugda Bora District and in south and north Wollo provinces, respectively. This difference may be due to improved management system, and for majority of the donkeys examined were of adult age and also due difference in agro ecological locations.

The infection with *Oxyuris equi* in the study area (3%) agree with the reports, such as 3% prevalence of Ayele *et al.* (2006), 4.5 by Naramo *et al.* (2015) and Getachew *et al.*(2010) who reported 2% in donkeys, and lower than those reported as 15.6% by Tsegaye and Chala(2015) in and around Haramaya. The low prevalence in this study might be climatic difference between the study areas as the effect of relative temperature affects the highly susceptible *Oxyuris equi* eggs.

In general, epidemiology of parasitic diseases can be directly or indirectly associated with various intrinsic factors like age, sex, host specie, and body scoring; and extrinsic factors such as season, sampling methods, drug administered, parasite species and purpose of keeping (Tahir *et al*., 2016).The variable level assessment of prevalence and association indicated that from the variables included in the study, there was no significant association (P>0.05) observed except the deworming history (P<0.05) and age group (P<0.05) among the study animals. Specifically during sex related comparison there was no any significant difference (P>0.05) in infection among sex groups and, this agree with the works of Ayele and Dinka, (2010), Wubie and Getaneh (2015). Both sex, male and female, showed no significant difference in prevalence of helminthes infection, because both sexes share equal chances of acquiring infection, because they are reared and grazed on the same pasture or management system without sex discrimination, but the proportion indicated small deviation of infection between males and females and this could result from decreased infection resistance at the time of parturition and during early lactation. The periparturient relaxation of resistance to gastrointestinal nematode infection has been reported in the female donkeys (Saleh *et al*., 2016).

Regarding to body condition score, there also no significant association observed (P>0.05). This goes in line agreement with the findings of Tola *et al*. (2011) Even though there was no association between three items; the percentage occurrence and the relative level of infection was higher in donkeys with poor BCS than medium and with good BCS. The highest chance of harboring the parasites in animals with poor body condition score, could bedue to the fact that, animals with poor body condition might be immuno-compromised probably due to malnourishment and higher workload and as a result be exposed to parasitism.More prevalent helminthes parasites were in animals with poor body condition than good and medium body condition score was also reported by Getaneh *et al* (2015), Regassa and Yimer (2013), Naramo *et al* (2016) who concluded the significant difference in parasite infection and body condition with relative difference in likelihood of infection between poor and animals with well body condition. Data on the consistency of faeces related prevalence indicated no statistically significant difference P>0.05 between the faecal consistency and the existence of infection, this might be associated to the distribution of ova with in feces.

Deworming frequency had significant association (P<0.05) with prevalence of Helminthes infections. High prevalence was recorded in non-dewormed animals and lower prevalence in dewormed and also highest mean level of infection was in non-dewormed than dewormed, This is in agreement with the report of Zerihun *et al.* (2011) and Ayele and Dinka (2010). The reason why dewormed equines infected might be either due to the anthelmintic used for the treatment suppress egg production. This reduced prevalence might also be due to decreased pasture contamination by the dewormed donkeys. Although, the donkeys which dewormed shed considerable amount of ova, severity of parasitism was higher in animals which were never dewormed. The current study also confirmed this type of conclusion so that, donkeys with no history of recent deworming had significantly high mean egg counts compared with those routinely dewormed. This indicated that routine deworming of donkeys with effective anthelmintic will reduce egg burden, thereby safe-guarding the animals from nematode infections.

The age wise prevalence and severity index indicated the significant association of variable towards the infection, in which P<0.05. The youngest and middle aged animals infected at higher percentage and level than those elder age groups. This finding was consistent with the finding of Enigidaw *et al.* (2015) in and around Kombolcha; this is also true in the findings of Fikru *et al.,* (2005).The observed difference between age group could be due to a reduced adaptation of young groups to helminthes infection and low immunity.

The mean EPG count reported in this study for a donkey was 627.8 which was not in line of agreement and lower as compared with previous works, Takele and Nibret (2013) who reported710.05 in Bahir-Dar; Ayele and Dinka (2010) and who reported2893in central Shoa, Ethiopiaand1423.73 by Wubie and Getaneh (2015) in and around Adet town. The difference might be associated with geographical variation and climatic factors; and also be due to the owner's awareness towards management and regular deworming of their animals.

Regarding to the severity of infection, among the infected animals majority 156(44%) were infected lightly which indicated the higher incidence in light infected animals and lower in moderate 134(38.2%) to heavy 61(17.4%) infected animals. This agree with the report of Adam *et al.* (2013) who reported high incidence (58.6%) for mild infection and low incidence (21.9%) and (19.5%) for moderate and severe infections respectively in Sudan. Also the difference in severity was reported in previous studies. The higher incidence 121(57.6%), for severe infection and lower incidence 78(26.4%), and 96(32.5%) for moderate and mild infected respectively reported in works of Gebreyohans *et al.*,(2017) and Nuraddis *et al.,* (2011) who reported 53.6% of donkeys were infected severely while moderate and mild infection had the lower incidence 15.9% and 8.6% respectively in and around Hawassa .This might be due to agro ecology, management practices applied and also be due to the increased awareness of the community towards supporting their animals through deworming and caring.

The larva culture revealed that among recovered larvae species the majority were the larvae of *strongylus spp*.(62%).There also an involvement of some other species,(14.1%) *Triodontophorus* spp., (7.6%) *Oesophagodontus* spp., (13%)*Cyathostomes* and (3.3%) *strongloides* spp. were also encountered during the investigation.On this basis, the majority of donkeys in the study area were infected with *strongylus spp*. The greater percentage of infection with *strongylus spp*. and this pattern of prevalence was also the report of previous reporters, Hailu and Ashenafi (2013) in Arsi-bale highlands, Gebreyohans *et al.* (2017) in and around Mekelle area and also true in Nuraddis *et al.*(2014), in and around Hawassa.

There was also difference in prevalence, genera and species of identified larvae observed and between different study areas, the difference might be associated with the rate of development and survival of the free-living stages of the larvae is depends on the surrounding temperature and humidity or rainfall, and altitude(Gebreyohans *et al.,* (2017).This confirmed thatwith variations inweather conditions, there might also be variation in prevalence, level of infection and also the increment or reduction of the species involved. This might probably be due to availability of suitable agro ecology for development of the infection, development of parasitic larvae, and also to the enough grazing land and pasture for continuity of life cycle.

Generally the reduced recovery of larvae cultured, ova shed and egg count in current study area might be due to the climatic conditions and also due to management practices, as most of the donkeys under the study area

were not accessible to free grazing and most of the animals were supplemented so that they have less chance of ingesting large amount of gastrointestinal parasites eggs and larvae.

5. Conclusion and Recommendations

The findings of the present study indicated a high prevalence of helminthic parasites and the species involved in compromising the health of donkeys. The study clearly showed that donkeys of all age groups, sex, and body condition score; those treated and non-treated ; and releasing different consistency of feces, were affected by helminthes parasites, but age and deworming history are the most prominent risk factors associated with gastrointestinal helminthes infection. Considering the socioeconomic importance of donkeys in the society, the following recommendations were forwarded; Strategic GIT parasite deworming and control should be identified. Creating awareness to different individuals, and owners, towards management practices, so that extension program should be forwarded by governmental organization and non-governmental organizations.

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