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Study on Gastrointestinal Helminthes of Scavenging Chickens in Hawassa and Shashemene Towns

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Abstract: A cross- sectional study was carried out from November 2015 to April 2016 in the local markets of Hawassa and Shashemene towns. The study was conducted with the aim of determining the prevalence of gastrointestinal helminthes of scavenging chickens. In order to met this aim 384 chickens were randomly selected and freshly voided faeces were taken from each of them and coprological examination was performed using simple floatation technique and also 40 chickens were randomly bought and sacrificed for postmortem examination and identification of adult helminth parasites. The faecal samples examined revealed an overall prevalence of 243 (63.3%) and among the helminth parasite eggs recovered 129 (33.6%) and 70 (18.2%) were nematodes and cestodes respectively. The remaining 44 (11.5%) were mixed infections. The postmortem examination showed an overall prevalence of 32 (80%) and 50% infection with *Capillaria species*, followed by *Heterakis gallinarum* (42.5%), *Raillietina echinobothrida* (40%), *Raillietina tetragona* (32.5%), *Ascaridia galli* (27.5%) and *Raillietina cesticillus* (25%). Up on coproscopic examination, there was a significant difference ($P < 0.05$) in the overall prevalence of helminth parasites between age groups with more parasites prevalent in young chickens (69.3%) than adults (59.4%), but there was no significant difference in the prevalence of helminth parasites between sex as well as between study sites ($P > 0.05$). In addition, up on postmortem examination, there was no significant difference observed between all risk factors that were taken into consideration. This study indicated that helminthosis was highly prevalent at both study areas. Therefore, great effort is needed towards the improvement of the management systems as well as the implementation of effective control and prevention strategies.

Key words: Helminthosis · Scavenging Chicken · Prevalence · Ethiopia

INTRODUCTION

The total poultry population of Ethiopia is estimated at 50.38 million, of which about 99% are raised under the traditional backyard system of management, while 1% are exotic breeds maintained under intensive management system [1]. Poultry production system in Ethiopia is an indigenous and integral part of the farming system that ranges from nil input traditional free ranges to modern production system using relatively advanced technology. There is also a small-scale intensive system with small number of birds (from 50 to 500) as an urban and peri-urban small-scale commercial system using exotic birds and relatively improved feeding, housing and health care [2, 3].

The purposes of chicken production are for income, egg hatching for replacement, consumption, for cultural and/or religious ceremonies and egg production [4]. The Southern Nation Nationalities People Region (SNNPR) of Ethiopia possess about 8.11 million chicken populations of which 97.9% and 2.1% are in rural and urban areas respectively [5].

Poultry productivity is enhanced by application of sound principles of health protection and management [6]. The economic contribution of the sector is not still proportional to the large chicken numbers, attributed to the presence of many productions, reproduction and infrastractural constraints. Hence, in Ethiopia poor management, nutritional deficiency and poultry diseases are the most important factor in reducing both the chicken's population and their productivity [7].

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Although parasitic diseases are among the major causes that decrease productivity of chickens, they are often neglected as they are rarely lethal. Helminthosis was considered to be an important problem of local chickens and helminth parasites were incriminated as major causes of ill-health and loss of productivity in different parts of Ethiopia [8, 9]. Parasitism is one of the major problems which inflict heavy economic losses to the poultry in the form of retarded growth, reduced weight gain, decreased egg production, diarrhea, obstruction of intestine, poor feathers, replacement birds that take too long to reach maturity, morbidity and mortality. Stress from parasites could affect the blood picture and cause anorexia [10, 11].

Helminth parasites of poultry are commonly divided into three main groups; nematodes, cestodes and trematodes which are mostly rare. Nematodes constitute the most important group of helminth parasites of poultry both in number of species and the extent of damage they cause; the main genera include *Capillaria, Heterakis* and *Ascaridia*. The cestodes of significant importance are of the two genera *Railleitina* and *Hymenolepsis* [12]. In the commercial table egg production systems the most commonly occurring helminth species are *Ascaridia galli*, *Heterakis gallinarum* and *Capillaria spp* [13].

The prevalence and intensity of helminth infections may be influenced by several factors, including host factors, such as age, sex and breed, can also influence helminth infections. Furthermore, climatic conditions (temperature and humidity) may alter the population dynamics of the parasites, resulting in dramatic changes in the prevalence and intensity of helminth infections [14].

A large number of helminthes are still widely distributed throughout the world in free –range poultry. In studies by Ruff [15], 100% of the rural scavenging chicken examined in Cross River Nigeria, was positive for one or more helminthes parasites. In another study, Saidu *et al.* [16] reported 45% of *Ascaridia galli* and 35% *Heterakis gallinarum* [17-19] all reported high prevalence of multiple infections in their survey.

Several researchers have conducted a study on the prevalence of helminth parasites of poultry in different parts of the country [8, 4]. but still the problem is not alleviated and more work on the identification of the different parasites and focus on the treatment as well as the control and prevention is needed.

Therefore, the objectives of this research paper were;

- To estimate the prevalence, species composition and distribution of GIT helminthes of scavenging chickens at both study areas.
- To assess the associated risk factors of Helminthosis in chickens

MATERIALS AND METHODS

Study Areas: The study was conducted from November 2015 to April 2016 in Hawassa and Shashemene towns. Hawassa is a city in Ethiopia, on the shores of Lake Hawassa in the Great Rift Valley. The town serves as the capital of the Southern Nation Nationalities and Peoples Region (SNNPR) and is a special zone of this region. It lies between 7° 03' 00" N and 38° 28' 00" E and has an elevation of 1680 m above sea level. Shashemene is a town and a separate woreda in West Arsi Zone, Oromia Region, Ethiopia. The town lies about 150 miles (240 km) from the capital of Addis Ababa and it has a latitude of 7° 12' 00" N and a longitude of 38° 36' 00" E and has an elevation of 2009 m above sea level [20].

Study Animals: The study population comprised of scavenging chickens from the local markets in Hawassa and Shashemene towns. The chickens were kept traditionally. At the day time the chickens were kept freely in and around their premises and spent the night at the home of the owners. In both conditions the chickens feed themselves by scavenging on the floor. Both sexes were studied and also the chickens were grouped in to two age groups as young and adult. Chickens with age from 6-12 months was taken as young and those above 12 months of age was taken as adults [14].

Sample Size Determination: Sample size was calculated according to Thrusfield [21]. From the previous study done by Berhanu, *et al*. [22] a coproscopic prevalence of 77.8% was found and this was taken as expected prevalence. This value was inserted in the thrush field formula and a sample size of 265 was determined, but for the sake of precision faecal samples were taken from 384 chickens for the purpose of coproscopic examination. Another 40 chickens were also sampled for the purpose of postmortem examination. So a total of 424 chickens were sampled for the study.

Thrusfield; formula; $$\frac{n = (1.96^2 . Pexp) (1- Pexp)}{d^2}$$

n = Required sample size
Pexp = Expected prevalence
d = Desired absolute precision (0.05)

Thus, by using this formula the required sample size calculated was 265, but 384 samples were collected for the sake of increasing precision.

Sampling Method: Simple random sampling technique was used to collect a fecal sample from individual chickens then the samples were transported to Hawassa University School of Veterinary Medicine parasitology laboratory for immediate processing. In addition 40 chickens randomly bought from the local markets of Hawassa and Shashemene towns were selected for postmortem examination.

Study Methodology

Fecal Sample Examination: For each chicken fecal samples were collected manually by taking freshly voided feces using a glove then the fecal samples were put in to sampling bottles, labeled and transported to Hawassa University School of Veterinary Medicine parasitology laboratory for immediate processing. Floatation technique was used to observe parasitic eggs by using sodium chloride solution as a floatation medium.

Postmortem Examination: Fourty birds were sacrificed and the gastrointestinal tract were removed, opened longitudinally and examined for the presence of adult parasites. The mucosa were scraped to obtain parasites adhering to the mucosal layer. All collected helminth parasites were put in a sampling bottle which contain 70% alcohol and examined using a stereomicroscope. Identification of parasites was carried out using the characters described by Soulsby [23].

Study Design: A cross - sectional study was carried out from November 2015 to April 2016 at the local markets of Hawassa and Shashemene towns with the aim of determining the prevalence of helminth parasites. Farmers at both local markets who brought the chickens were selected randomly and the chickens were also selected randomly too.

Data Management and Analysis: The data obtained were first entered in to Microsoft excel 2007 work sheet and were analyzed using SPSS version 19 and STATA version 12 statistical software programs. The association between the prevalence of each parasite with the risk factors was seen using chi- square. In all cases $p<0.05$ was considered as statistically significant.

RESULTS

Coproscopic Finding: From a total of 384 scavenging chickens examined 243(63.3%) were found positive for gastro intestinal helminth eggs. Of the total recovered helminth eggs 129(33.6%) and 70(18.2%) were nematodes and cestodes respectively and the remaining 44(11.5) were mixed infections (Table 1).

From 159 examined female chickens and a total of 225 examined male chickens, 99(62.2%) of the females and 144(64%) of the males were found positive for gastrointestinal helminthes. The number of young chickens examined was 150 and 104(69.3%) were found positive and from 234 adults examined, 139(59.4%) were found positive. 192 samples were taken from each sites and 123(64%) and 120(62.5%) positive results were found at Shashemene and Hawassa towns respectively. A significant difference ($P< 0.05$) was observed on the prevalence of helminth parasites between young and adults. Young chickens were highly infected (1.55% higher than that of adults) or adult chickens were lesser infected (1.46% less than that of young chickens). There was no significant difference observed ($p > 0.05$) on the prevalence of helminth parasites between male and female and also between study sites (Table 2) 47(29.6%) out of 159 examined female chickens and 82(36.4%) out of 225 examined male chickens were found positive for gastrointestinal nematode parasites. The number of young chickens examined was 150 and 53(35.3%) were found positive and from 234 adults examined, 76(32.5%) were found positive. 192 samples were taken from each site and the prevalence of nematode parasites was 60(31.2%) and 69(35.9%) in Shashemene and Hawassa towns respectively. There was no significant difference observed ($P > 0.05$) on the prevalence of nematode parasites between all risk factors that was considered (Table 3).

From 159 examined female chickens and a total of 225 examined male chickens, 28(17.6%) of the females and 42(18.7%) of the males were found positive for gastrointestinal cestode parasites. The number of young chickens examined was 150 and 30(20%) were found positive and from 234 adults examined, 40(17%)

Table 1: The overall coproscopic prevalence of helminthes parasites

Parasites	Number positive	Prevalence (%)
Nematodes	129	33.6%
Cestodes	70	18.2%
Nematodes + Cestodes	44	11.5%
Total	243/384	63.3%

Table 2: Coproscopic prevalence of helminth parasites in relation with risk factors

Risk factors		No. examined	No. positive	Prevalence (%)	χ^2(P- value)
Sex	Female	159	99	62.2 %	0.1208(0.728)
	Male	225	144	64 %	
Age	Young	150	104	69.3 %	3.8802(0.049)
	Adult	234	139	59.4 %	
Study site	Shashemene	192	123	64 %	0.1009(0.751)
	Hawassa	192	120	62.5 %	

Table 3: Coproscopic prevalence of nematode parasites in relation with risk factors

Risk factors		No. examined	No. positive	Prevalence (%)	χ^2 (P- value)
Sex	Female	159	47	29.6%	1.9795(0.159)
	Male	225	82	36.4%	
Age	Young	150	53	35.3%	0.3339(0.563)
	Adult	234	76	32.5%	
Study site	Shashemene	192	60	31.2%	0.9456(0.331)
	Hawassa	192	69	35.9%	

Table 4: Coproscopic prevalence of cestode parasites in relation with risk factors

Risk factors		No. examined	No. positive	Prevalence(%)	χ^2(P- value)
Sex	Female	159	28	17.6%	0.0698(0.792)
	Male	225	42	18.7%	
Age	Young	150	30	20%	0.5178(0.472)
	Adult	234	40	17%	
Study site	Shashemene	192	42	21.8%	3.4242(0.064)
	Hawassa	192	28	14.6%	

were found positive. 192 samples were taken from each site and the prevalence of cestode parasites was 42(21.8%) and 28(14.6%) in Shashemene and Hawassa towns respectively. There was no significant difference observed (P > 0.05) on the prevalence of cestode parasites between all risk factors that was considered (Table 4).

Postmortem Finding: From a total of 40 chickens examined by postmortem 32(80%) were found positive for one or more types of adult helminth parasites. The postmortem examination revealed an overall prevalence of 32 (80%) and 50% infection with *Capillaria species*, followed by *Heterakis* (*H) gallinarum* (42.5%), *Raillietinae* (*R). echinobothrida* (40%), *R . tetragona* (32.5%), *Ascaridia* (*A). galli* (27.5%) and *R. cesticillus* (25%).

From a total of 40 scavenging chickens examined 32(80%) were found positive for Gastro intestinal helminth parasites and among helminth parasites recovered 6(15%) and 4(10%) were nematodes and cestodes respectively and the remaining 22(55%) were mixed infections (Table 5).

The postmortem examination revealed an overall prevalence of 32 (80%) and 50% infection with *Capillaria species*, followed by *H. gallinarum* (42.5%), *R. echinobothrida* (40%), *R. tetragona* (32.5%), *A. galli* (27.5%) and *R. cesticillus* (25%). (Table 6).

From the nematode parasites that were recovered, *Capillaria species* was the most prevalent in both females (57.9%) and in male chickens (42.8%). From cestode parasites, *R. tetragona* and *R. echinobothrida* was the most prevalent parasites in females (36.8%) and male chickens (52.5%) respectively. There was no significant difference observed on the postmortem prevalence of helminth parasites (p > 0.05) between male and female (Table 7).

Table 5: The overall postmortem prevalence of helminth parasites

Parasites	Number positive	Prevalence%
Nematodes	6	15%
Cestodes	4	10%
Nematodes + Cestodes	22	55%
Total	32	80%

Table 6: Prevalence of helminth species identified up on postmortem examination

Species of parasites	No. Positive	Prevalence%
Nematodes		
Capillaria species	20	50%
Heterakis gallinarum	17	42.5%
Ascaridia galli	11	27.5%
Cestodes		
Raillietina echinobothrida	16	40%
Raillietina tetragona	13	32.5%
Raillietina cesticillus	10	25%

Table 7: Postmortem prevalence of helminth parasites in relation with sex

Species of parasites	Female	Male	χ^2(P- value)
Nematodes			
Ascaridia galli	36.8%	19%	1.5842(0.208)
Capillaria species	57.9%	42.8%	0.9023(0.342)
Heterakis gallinarum	52.6%	33.3%	1.5202(0.218)
Cestodes			
Raillietina echinobothrida	26.3%	52.3%	2.8237(0.093)
Raillietina tetragona	36.8%	28.6%	0.3110(0.577)
Raillietina cesticillus	26.3%	23.8%	0.0334(0.855)

Table 8: Postmortem prevalence of helminth parasites in relation with age

Species of parasites	Young	Adult	χ^2(P- value)
Nematodes			
Ascaridia galli	33.3%	24%	0.4096(0.522)
Capillaria species	66.7%	40%	2.6667(0.102)
Heterakis gallinarum	40%	44%	0.0614(0.804)
Cestodes			
Raillietina echinobothrida	40%	40%	0.0000(1.000)
Raillietina tetragona	33.3%	32%	0.0076(0.931)
Raillietina cesticillus	33.3%	20%	0.8889(0.346)

Table 9: Postmortem prevalence of helminth parasites in relation with study sites

Species of parasites	Shashemene	Hawassa	χ^2(P- value)
Nematodes			
Ascaridia galli	30%	25%	0.1254(0.723)
Capillaria species	50%	50%	0.0000(1.000)
Heterakis gallinarum	45%	40%	0.1023(0.749)
Cestodes			
Raillietina echinobothrida	40%	40%	0.0000(1.000)
Raillietina tetragona	40%	25%	1.0256(0.311)
Raillietina cesticillus	15%	35%	2.1333(0.144)

Table 10: Postmortem prevalence of nematode parasites in relation with risk factors

Risk factors		No. examined	No. positive	Prevalence%	χ^2(P- value)
Sex	Female	19	15	79%	1.3796(0.240)
	Male	21	13	62%	
Age	Young	15	12	80%	1.1429(0.285)
	Adult	25	16	64%	
Study site	Shashemene	20	15	75%	0.4762(0.490)
	Hawassa	20	13	65%	

Table 11: Postmortem prevalence of cestode parasites in relation with risk factors

Risk factors		No. examined	No. positive	Prevalence%	χ^2(P- value)
Sex	Female	19	12	63.1%	0.0540(0.816)
	Male	21	14	66.7%	
Age	Young	15	10	66.7%	0.0293(0.864)
	Adult	25	16	64%	
Study site	Shashemene	20	13	65%	0.0000(1.000)
	Hawassa	20	13	65%	

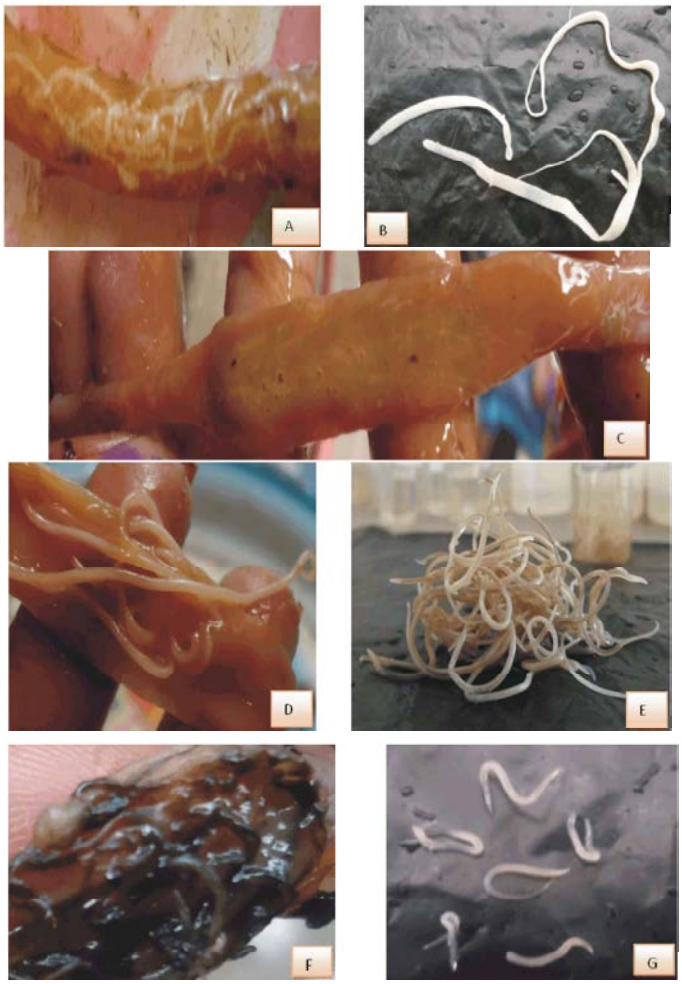

Fig. 1: Adult helminth parasites recovered during postmortem examination

Description: *Raillietina species* in the small intestine (A), *Raillietina species* clear and preserved(B), *Capillaria species* in the small intestine(C), *Ascaridia galli* in the small intestine(D), *Ascaridia galli* clear and preserved (E), *Heterakis gallinarum* in the cecum (F), *Heterakis gallinarum* clear and preserved(G)

From the nematode parasites that were recovered, *Capillaria species* and *H. gallinarum* was the most prevalent parasites in young (66.7%) and in adult chickens (44%) respectively. From cestode parasites, *R. echinobothrida* was the most prevalent parasite in both young and adult chickens which was 40% in both and also the prevalence of *R. tetragona* and *R. cesticillus* was equal in young chickens (33.3%). There was no significant difference observed on the post mortem prevalence of helminth parasites ($p > 0.05$) between young and adult (Table 8).

From the nematode parasites that were recovered, *Capillaria species* (50%) were the most prevalent parasites in both study sites. From cestodes, *R. echinobothrida* was the most prevalent parasite in both study sites with an equal prevalence of (40%). The prevalence of *R. echinobothrida* and *R. tetragona* was also equal in Shashemene town which was 40%. There was no significant difference observed on the postmortem prevalence of helminth parasites ($p > 0.05$) between study sites (Table 9).

From 19 female and 21 male chickens examined under postmortem, 15(79%) and 13(62%) were found positive for adult nematode parasites respectively. From 15 young and 25 adult chickens examined 12(80%) and 16(64%) were positive for adult nematodes respectively. 20 chickens were sampled from each site and the prevalence of adult nematode parasites was 15(75%) and 13(65%) in Shashemene and Hawassa towns respectively. There was no significant difference observed ($P > 0.05$) on the postmortem prevalence of nematode parasites between all risk factors that was considered (Table 10).

From 19 female and 21 male chickens examined under postmortem, 12(63.1%) and 14(66.7%) were found positive for adult cestode parasites respectively. From 15 young and 25 adult chickens examined 10(66.7%) and 16(64%) were positive for adult cestodes respectively. 20 chickens were sampled from each site and the prevalence of adult cestode parasites was equal which was 13(65%) in both Shashemene and Hawassa towns. There was no significant difference observed ($P > 0.05$) on the postmortem prevalence of cestode parasites between all risk factors that was considered (Table 11).

DISCUSSION

The result of this study revealed a high prevalence of gastrointestinal helminth infections among scavenging chickens. The overall coproscopic and postmortem prevalence of gastrointestinal helminthes were 63.3% and 80% respectively.

In the previous study by Berhanu *et al*., (2014) with a similar agro- climatic condition revealed a coproscopic prevalence of 77.8%. As the authors described this much prevalence was obtained as a result of the free roaming nature of the chickens and their continuous contacts with intermediate hosts such as snails, slugs and earth worms or infective stages and also as a result of lack of deworming activity by the owners. The present study showed a progress and revealed prevalence slightly decreased from the previous report [22], ie (63.3%). This might be due to the buildup of awareness in some of the owners to regularly deworm their chickens and better sanitary status of the specific areas where the samples were taken.

No matter how, the overall prevalence of the present study (63.3%) showed a relative decrease from the previous reports of 77.8% [22], the overall figure still remains high. This might be as a result of their indiscriminate scavenging behaviour. The chickens usually seek their food in the superficial layers of the soil which was often contaminated with living organisms of all kinds including various insects or earth worm that serve as paratenic or intermediate hosts for helminth parasites that potentially affecting poultry.

The coproscopic finding of the present study is comparable with a report of Yehualashet cited in Tesfaheywet, Amare and Hailu [24] which was 59.64%. Moreover, the current finding was higher than the reports of Tesfaheywet, [24] and Hirut cited in Tesfaheywet, Amare and Hailu [24] which were 41.1% and 39.2% respectively. This difference may be due to the fact that these studies were performed at selected commercial poultry farms, so there would be indoor management of the chickens and lesser access to intermediate hosts and infective stages and also less accessibility and contact with faeces of other flocks, so all this conditions may lower the prevalence of the parasites.

The overall coproscopic prevalence of helminth parasites of scavenging chickens showed a significant statistical difference ($P < 0.05$) between age groups in which higher rate of infection was observed in young chickens than adults. This could be due to the fact that adult birds were experiencing the environment more than the young birds. Odds ratio was calculated using logistic regression in order to identify the degree of infection and as was observed, young chickens were highly infected (1.55% higher than that of adults) or adult chicken were less infected (1.46% lower than that of young chickens.). Since the study areas experience almost similar agro - climatic condition, there was no significant variation in the prevalence of helminthosis among chickens origin.

In addition, the result showed no significant variation in the overall prevalence of helminthosis between sex. This might be due to an equal chance of access to infection or no difference on protective immunity for the disease, but the study in the local and exotic chickens in Nigeria [12] explained that female chickens were more infected with helminth parasites than males and this is mainly because of females are voracious in their feeding habits especially during egg production than the males which remain largely selective, so this factor could increase the risk of infection in females than males.

Coproscopic finding showed a none statistical significant difference ($P > 0.05$) on the prevalence of single infections among all the risk factors considered. This might be due to the fact that the parasitic burden of single infections would not be as high as the mixed infections. When there is occurrence of mixed infections the immunity of the host would be compromised.

On postmortem examination, six helminth species were identified. These are cestode parasites (*Raillietina species* such as *Raillietina echinobothrida*, *Raillietina tetragona* and *Raillietina cesticillus*) and nematode parasites (*Ascaridia galli, Heterakis gallinarum* and *Capillaria species*).

From a total of 40 scavenging chickens examined under postmortem 32(80%) of the chickens were infected by helminth parasites. This result is comparable with previous reports of 89.5% [25], 88.5% [22] from Ethiopia and 87.8% [17] from Nigeria. However, the result is lower than the prevalence rate of gastrointestinal parasites of scavenging chickens which was reported to be 100% from central Zambia [26, 27] from Algeria. This degree of difference might be due to a difference in the agro climatic conditions and management. The result of this study was higher than previous report 72% [28] from India. This could also be attributed to difference in the agro- climate and poor management. From the cestode parasites recovered on postmortem *Raillietina echinobothrida* was the most prevalent(40%). This result was in line with a previous report of 42% [17] from Nigeria and it was slightly higher than a previous report of 33.3% [29] from Kenya. The result is by far higher than the previous report of 5.39% [30] from Pakistan.

Raillietina tetragona was the second most prevalent cestode parasite in this study with a prevalence of (32.5%). This result was in line with a previous report of 38.5% [17] from Nigeria and 35.8% [8] from Ethiopia. The result was lower than the previous reports of 56.5% 25] and higher than reports from [22] which was 20.5%.

Raillietina cesticillus was the least prevalent cestode parasite in this study with a prevalence of (25%). This result was in line with a previous report of 22.5% [31] from India. It was lower than the previous reports of 48.5% [25] and by far lower than a previous report of 83.5% [32]. The result was higher than the previous results of 19% [8] and much higher than reports of 8.2% [22] from Ethiopia and 2% [33] from Ghana.

In the present study the prevalence of cestode parasites (*Raillietina species*) is high. This high prevalence of *Raillietina species* could be attributed to the wide spread and ease accessibility of intermediate hosts to the scavenging chickens. Ants were very commonly observed in both study areas. *Raillietina echinobothrida* and *Raillietina tetragona* are considered to be studied harmful to chickens as reported [8].

From the nematode parasites that were recovered from postmortem, *Capillaria species* was the most prevalent (50%). This result was by far higher than that of the previous reports of 13.1% by Berhanu *et al.* [22] and 1.58% by Ashenafi and Eshetu [8] and 3.2% by Heyradin *et al.* [25]. The higher prevalence of these parasites from the previous studies might be due to the availability of earth worms, intermediate hosts for some *capillaria species* at the study areas and ease of access to the chickens of the study areas.

Heterakis gallinarum is the second most prevalent nematode parasites in this study with a prevalence of (42.5%). This result is in line with the result of Heyradin *et al*., who found 37.9%. It was higher than that of the previous studies with a prevalence of 17.28% [34] and 32.8% in Zambia [26]. The result was lower in prevalence than Berhanu *et al*., who documented a prevalence of 51.6% from Ethiopia and much lower than reports of 78.07% [27] from Algeria.

In this study, the prevalence of *Heterakis gallinarum* was higher and this might be as a result of the suitability of the agro- climatic conditions for the possible survival of the parasite.

Among the intestinal nematodes that were identified prevalence of *Ascaridia galli* was 27.5%. This result was comparable with reports of other studies, 32.3% [25] from Ethiopia and 33.3% [29] and 22.2- 43.8% [35] from Kenya and South Africa respectively.

The result was lower than other previous reports of 51.6% [12] from Nigeria and previous reports of 80% by Gedion cited in Ashenafi and Eshetu [8] from Ethiopia. This large degree of difference might be due to the difference in the agro- climatic condition of the study areas or the prevalence was higher in the previous studies due to the presence of predisposing factors to *A. galli* infection such as young age, protein- deficient feed or intestinal coccidiosis.

On postmortem examination of scavenging chickens there was no significant difference observed ($P > 0.05$) on the prevalence of both mixed and single infections between all the risk factors that were considered. This could be due to the fact that small number of chickens were sampled for the examination. When sample size decreases precision will decrease and when sample size increases precision will increase, So this could be taken as a reason.

Both in coproscopic and postmortem examinations mixed infections were common which was 11.5% on coproscopic and 55% on postmortem examinations respectively. The presence of mixed infections were reported in previous studies [8, 22] from Ethiopia and [17, 26] from Nigeria and central Zambia respectively.

In this study the overall coproscopic and postmortem prevalence of nematode parasites was higher than the prevalence of cestode parasites .This finding is in general agreement with reports of Berhanu, *et al*., [22]. Nematodes constitutes the most important group of helminth parasites of poultry both in number of species and the extent of damage they cause [36].

CONCLUSION

This study revealed that the overall coproscopic and postmortem prevalence of helminth parasites of scavenging chickens at Hawassa and Shashemene towns were 63.3% and 80% respectively. The parasites recovered from the study are six in number; namely *Ascaridia galli*, *Heterakis gallinarum*, *Capillaria Spp*, *Raillietina echinobothrida*, *Raillietina tetragona* and *Raillietina cesticillus*. The coproscopic prevalence of helminthiasis showed a significant difference among young and adult chickens in which higher rate of infection was recorded in young chickens. This implies that age is the major risk factor that predispose the chickens for helminth infection. The study clearly indicated that scavenging chickens kept under poor and low input management systems in both study areas were exposed to a wide variety of internal helminths. This is associated with their indiscriminate scavenging behaviour and their continous contact with infective stages or certain intermediate hosts. Even if there was minimal health care and input management the chickens at both study areas supply eggs and meat for house hold consumption and income generation. The impact inflicted by helminthiasis on the economic and production sector is very high especially for a country like Ethiopia. In general minimal health care, poor sanitation and management were among the major factors for the higher prevalence of helminth parasites in this study sites.

Based on the above conclusion the following recommendations are forwarded;

- The poultry farmers who produce poultry should be aware of the impact of helminths and the importance of sanitation on the control of these parasites.
- Regular strategic deworming should be practiced to reduce the parasite burden.
- Sustainable ways of controlling these parasites and further studies on period prevalence of helminth parasites in chickens need to be designed for improved intensive egg and poultry meat production.

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