Prevalence and Associated Risk Factors of Major Gastrointestinal Parasites of Pig Slaughtered at Addis Ababa Abattoirs Enterprise, Ethiopia

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Abstract

A cross-sectional study was conducted to determine prevalence and associated risk factors of gastrointestinal tract (GIT) parasites of pigs slaughtered at Addis Ababa Abattoirs Enterprise (AAAE) from October, 2009 to May, 2010 using systematic random sampling technique. A total of 390 pigs were sampled to assess and identify different genera of GIT parasites of pig. For this study, faecal samples were collected from a total of 390 pigs’ slaughtered in the abattoir while post mortem adult parasite recovery was done by incision of liver, removing intestinal content, opening of the oecum and colon. The collected faecal samples were examined by zinc sulphate floatation and sedimentation techniques for isolation of parasitic eggs and/or oocysts. Out of 390 samples tested in the present study, an overall prevalence of 61.8% GIT parasite was identified. Among the examined samples, 16.2% (63/390), 12.8% (49/390), 6.9% (27/390), 3.9% (15/390), 11.8% (46/390), 10.5% (41/390) were identified as Ascaris suum (A. suum), Trichuris suis (T. suis), Oesophagostomum spp., Coccidia spp. and Fasciola hepatica (F. hepatica) ova/oocyst, respectively. The study had also revealed that about 11.28% and 37.69% pigs had harbored mixed and single infection, respectively. A Chi-square computed statistical analysis indicated that origin (χ²=3.5408; P>0.05), age (χ²=1.8628; P>0.05) and sex (χ²=0.0636; P>0.05) were insignificantly associated with the infection of GIT parasites in the study area. However, the prevalence of individual GIT parasite infections analysis revealed that both sex and age were significantly associated with the prevalence of Coccidia spp. (p<0.05) while origin was significantly associated with the prevalence of the nematode A. suum (p<0.05). An overall prevalence of 28.2% GIT parasites were identified upon postmortem adult parasite inspection. Our study revealed that pig GIT parasites were the major biological constraints contributing to the low productivity of pig and hampered the economic benefit obtained from the sector. Therefore, further detailed investigations are needed to formulate appropriate and cost-effective strategies for the control of gastrointestinal parasites in pig farms in Ethiopia.

Keywords: Gastrointestinal parasites; Pig; Prevalence; Risk Factors; Ethiopia

Abbreviations

AAAE: Addis Ababa Abattoirs Enterprise; CI: Confidence Interval; GIT: Gastro Intestinal Tract; MASL: Meters Above Sea Level; NaCl: Sodium Chloride; RPM: Revolution per Minute; χ²: Pearson’s Chi-square

Background

Pigs, also called hogs or swine, are ungulates which have been domesticated as a source of food, leather and similar products since ancient times. More recently, they have been involved in biochemical research and treatment [1]. Pig farming is an important task which provides opportunity as an income generating activity for small-scale farmers, especially in developing countries. This activity is most popular in Africa, Latin America, and South East Asia [2]. In most cases, the reasons for keeping pigs include provision of protein/meat, dowry, and manure for fertilizing the soil, particularly for farmers that practice mixed farming. However, swine could carry many intestinal pathogens which would hinder the growth of pigs, leading to significant economic losses to the livestock industries and farming communities [3,4].

Infection of pigs with GIT parasites is widely reported from all corners of the world and shown to be influenced by the type of pig management practiced [5]. Pig infected with GIT parasites had poor feed conversion rate and delays in achievement of market weight. Some of the GIT parasites of pigs result in condemnation of organs or entire carcasses causing economic losses in pork industry [6,7]. In addition, pigs infected with GIT parasites may act as source of zoonoses through contaminating the environment with infective stages of intestinal parasites present in their excreta [7,8]. The prevalence of pig born GIT parasites may further be complicated when some of the parasites of pigs infect man and vice versa [7].

Among GIT parasites, helminthes are major health problem to those swine grazing on pasture. Helminthes importance on swine is chiefly economical with its sub-clinical infection delay’s the achievement of market weight by being responsible for poor feed conversion rates [9]. The common helminth parasites of swine are...
Materials and Methods

Study populations

The study population was pig’s slaughtered at AAAE originating from Addis Ababa and Bishoftu areas. The majorities of the pig populations studied were from the Bishoftu area, where many large and small scale commercial pig farms are concentrated. In the Bishoftu area, pigs are mainly kept under an intensive production system. In the Addis Ababa area, both intensive and extensive pig management systems are common. All pigs including those less than three months of age belonging to both sexes (male and female) were considered for the purpose of this study. Age was determined using tooth eruption patterns [23].

Study designs and sample size determination

A cross-sectional study design was conducted to determine the prevalence of major gastrointestinal parasites of pig slaughtered at AAAE from October, 2009 to May, 2010 using systematic random sampling technique. The sample size was calculated according to Thrusfield [24] by considering 50% expected prevalence (P), 95% confidence interval (CI) (Z=1.96) with 5% desired absolute precision (d), using the formula N=(Z) 2 P (1-P)/d2. The calculated required sample size (N) was 384. However, the total number of sampled animals was increased to 390 to maintain the proportionality of the sample size.

Fecal sample collection and transportation

Fecal samples were collected directly from the rectum of pigs with strict sanitation in the abattoir, when the pigs are slaughtered (after stunning). About 5 gram of the collected fecal sample was put in sterile plastic containers and transported to AAAE general purpose laboratory. All faecal samples were kept in 10% buffered formalin as recommended by William and Anne [25,26] and stored at -20°C until processed and examined for eggs and oocysts of gastrointestinal helminths and protozoan’s, respectively.

Coproscopical examination

Zinc sulphate flotation: Three grams of fecal samples were mixed with 50 ml of 0.4g/ml zinc sulphate (flotation fluid) using mortar and pestil. The resulting fecal suspension was poured through a tea strainer into a centrifuge tube and centrifuged at 1500 revolution per minute (rpm) for 10 minutes. The centrifuge tube was then filled to the brim with more zinc sulphate and a cover slip placed on top of the tube and let to stand for 20 minutes. The cover slip was then removed from the centrifuge tube and placed on a glass slide for microscopic examination. Identification of parasitic eggs and oocysts was carried out as described by Kassai T and Charles [27,28].

Sedimentation: Sedimentation technique was used to recover eggs of intestinal helminths such as F. hepatica which do not float well in sodium chloride solution/zinc sulphate. For this purpose (for sedimentation), 3 gm of fecal sample was put in a conical flask and mixed with 30 ml of water; the mixture was then sieved through a tea strainer into a beaker and transferred into a centrifuge tube for centrifuging at 1500 rpm for 3 minutes. The supernatant was then discarded and sediment was mixed with 1% of methylene blue and examined under the microscope using 40 objective lens [29].

Materials and Methods

Description of the study area

The study was conducted in pigs slaughtered at AAAE originated from the two purposively selected sites in Central Ethiopia namely, Addis Ababa and Bishoftu areas. Addis Ababa is the capital city of Ethiopia located at longitude 38° 44′ ±24″E and latitude 9°1′ ±48″N. The altitude is from 2,200 to 3,300 meters above sea level (masl). The annual rainfall is 800-1,100 mm and the mean annual maximum and minimum temperature is about 21°C and 27°C, respectively [21]. Bishoftu is found in Adea district of East Shewa Zone of Oromia Regional State at a distance of 45 kms from Addis Ababa. Bishoftu town is situated at a longitude of 38°59′ E to 38°983′E and latitude of 08°45′N to 8.750′N at an elevation of 1920 masl. The average rainfall is about 839 mm, while the mean minimum and maximum temperatures recorded for 27 years ranged from 7.9°C to 28°C with an overall average of 18.5°C [22].
Postmortem examination

Liver, small intestine, cecum and colon were examined thoroughly to identify (recover) adult parasites during postmortem examination. Bile duct enlargement and irregularity in the morphology of the liver was inspected visually, and then palpation and multiple incisions of all visible bile ducts and their branches were conducted to search for adult Fasciola logged inside. Small intestine, colon and cecum were opened and examined for the presence of adult helminthes.

Data analysis

Data generated from laboratory investigations were recorded and coded using Microsoft Excel spreadsheet (Microsoft Corporation) and analyzed using STATA version 11.0 for Windows (Stata Corp. College Station, TX, USA). The prevalence of pig gastrointestinal parasite was calculated as the number of positive (egg/oocytes present) samples divided by the total number of samples tested. To identify association of prevalence with the risk factors (origin, age and sex) were computed by percentages and Pearson’s Chi-square ($\chi^2$) test. In all cases $P<0.05$ was considered as statistically significant.

Results

Overall prevalence of pig GIT parasites ova/oocyst identified in this study

Parasitological analytical data indicated that 241 of 390 total pig herd examined harbored either single infection or mixed infection. Based on egg/ova identification, the study had established 4 genera of nematode, a genus of protozoa and trematode (Table 1).

Table 1: Overall prevalence of GIT parasites ova/oocyst of pig slaughtered at AAAE

<table>
<thead>
<tr>
<th>Parasite identified (ova/oocysts)</th>
<th>Number of positive sample</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongyloides spp.</td>
<td>63</td>
<td>16.2</td>
</tr>
<tr>
<td>A. suum</td>
<td>49</td>
<td>12.6</td>
</tr>
<tr>
<td>T. suis</td>
<td>27</td>
<td>6.9</td>
</tr>
<tr>
<td>Oesophagostomum spp.</td>
<td>15</td>
<td>3.9</td>
</tr>
<tr>
<td>F. hepatica</td>
<td>46</td>
<td>11.8</td>
</tr>
<tr>
<td>Coccidia spp.</td>
<td>41</td>
<td>10.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>241</strong></td>
<td><strong>61.8</strong></td>
</tr>
</tbody>
</table>

Table 2: Overall prevalence of pig GIT parasites ova/oocyst in relation to origin, age and sex, NB: For origin, df=1, age, df=2, sex, df=1; df=degree of freedom

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number examined</th>
<th>Number of positive sample</th>
<th>Prevalence (%)</th>
<th>$\chi^2$</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Addis Ababa</td>
<td>151</td>
<td>83</td>
<td>54.97</td>
<td>3.5408</td>
<td>0.060</td>
</tr>
<tr>
<td>Bishoftu</td>
<td>239</td>
<td>108</td>
<td>45.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td>1.8628</td>
<td>0.394</td>
</tr>
<tr>
<td>Piglet</td>
<td>48</td>
<td>16</td>
<td>33.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grower</td>
<td>41</td>
<td>27</td>
<td>65.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>301</td>
<td>148</td>
<td>49.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td>0.0636</td>
<td>0.801</td>
</tr>
<tr>
<td>Female</td>
<td>218</td>
<td>108</td>
<td>49.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>172</td>
<td>83</td>
<td>48.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Prevalence of Pig GIT parasites ova/oocyst in relation to origin

From the parasite identified (ova/oocyst) in the present study, *Strongyloides* spp. was highly prevalent in pigs originated from Bishoftu (17.2%) while *A. suum* was the highly prevalent intestinal parasite in pig originated from Addis Ababa and its surruondings (Table 3)

Parasites identified (ova/oocysts) & Addis Ababa (n=151) & Bishoftu (n=239) & $\chi^2$ & P-value \\
--- & --- & --- & --- & --- \\
Strongyloides spp. & 14.6 & 17.2 & 0.4566 & 0.499 \\
A. suum & 18.5 & 8.8 & 8.0181 & 0.005 \\
T. suis & 4.6 & 8.4 & 2.0006 & 0.157 \\
Oesophagostomum spp & 4.6 & 3.3 & 0.4154 & 0.519 \\
F. hepatica & 15.2 & 9.6 & 2.7977 & 0.094 \\
Coccidia spp & 13.9 & 8.4 & 3.0179 & 0.082 \\

Table 3: Prevalence of Pig GIT parasites ova/oocyst in relation to origin, NB: n=number of animals examined; df =1, df=degree of freedom

Prevalence of pig GIT parasites ova/oocyst in relation to age group

High prevalence of Coccidia spp. (22.9%) oocyst was found in piglet slaughtered in the abattoir when compared to A. suum (8.3%), Strongyloides spp. (6.3%), T. suis (6.3%) while no Oesophagostomum spp. and F. hepatica ova were identified in this age group. Adult pigs were highly infected by Strongyloides spp. (17.6%) while Oesophagostomum spp. (3.7%) was the least among the parasite ova identified as depicted in Table 4.

Parasite identified (ova/oocyst) & Age group & $\chi^2$ & P-value \\
--- & --- & --- & --- \\
--- & Piglet(n=48) & Grower(n=41) & Adult(n=301) & --- \\
Positive (%) & Positive (%) & Positive (%) & --- \\
Strongyloides spp. & 6.3 & 17.1 & 17.6 & 3.9716 & 0.137 \\
A. suum & 8.3 & 19.5 & 12.3 & 2.6041 & 0.272 \\
T. suis & 6.3 & 7.3 & 6.9 & 0.0450 & 0.978 \\
Oesophagostomum spp. & 0 & 9.8 & 3.7 & 5.8221 & 0.054 \\
F. hepatica & 0 & 14.6 & 13.3 & 3.0842 & 0.214 \\
Coccidia spp & 22.9 & 14.6 & 7.9 & 10.6536 & 0.005 \\

Table 4: Prevalence of pig GIT parasites ova/oocyst in realtion to age group, NB: n=number of pigs examined; df=1, df=degree of freedom

Prevalence of pig GIT parasites ova/oocyst in relation to sex group

Female pigs were highly infected by GIT parasites ova/oocysts identified in this study when compared to male, except the Coccidia spp. which was highly prevalent in male pigs than in females (Table 5).

Parasite identified (ova/oocyst) & Sex & $\chi^2$ & P-value \\
--- & --- & --- & --- \\
--- & Female(n=218) (%) & Male(n=172) (%) & --- & --- \\
Strongyloides spp. & 17.4 & 14.5 & 0.5955 & 0.440 \\
A. suum & 14.2 & 10.5 & 1.2341 & 0.267 \\
T. suis & 8.3 & 5.2 & 1.3647 & 0.243
Table 5: Prevalence of pig GIT parasites ova/oocyst in relation to sex, NB: n=number of pigs examined; df =1, df=degree of freedom

<table>
<thead>
<tr>
<th>Infection types</th>
<th>Out of 390 pigs examined, 44(11.28%) and 147(37.69%) pigs were found to harbor mixed and single infections, respectively (Table 6).</th>
</tr>
</thead>
</table>

Table 6: Infection type in relation to origin, age and sex, NB: For origin, df =2; age, df=4; sex, df=2, df=degree of freedom

Recovery of adult GIT parasites by postmortem examination

The overall prevalence of adult GIT parasites in pig slaughtered at AAAE based on post mortem examination was 28.2%. The recovered adult parasites in the decreasing order of prevalence were *F. hepatica* (22.1%), *A. suum* (4.6%), *T. suis* (1.03%) and *Oesophagostomum* spp. (0.5%) (Table 7).
Ethiopia and Kenya with the prevalence of 6.7%, 39.1% reported T. suis prevalence of 0.3%, 2.9%, 4.7%, 4.6% and 5.2% of pig in the environment which facilitates ingestion of thick-shelled eggs and local circulating parasites in the locality. The survival of eggs of A. suum. These thick-shelled eggs are resistant to adverse environmental factors as well as chemicals and can maintain infectivity for long periods of time [43].

Strongyloides larvae depends on the environmental temperature and status, pre-exposure and probably nutritional status [39]. Induced immunity against parasites re-infection post-exposure is possible in pigs [50].

This study revealed that Strongyloides spp. was the most prevalent parasite followed by A. suum. This is in contrast with the findings of past studies where A. suum was reported as the most prevalent parasite in scavenging pigs [36-38] and also in semi-intensively managed pigs [16]. The high prevalence of Strongyloides spp. (16.2%) could be due to the differences in climatic conditions, management systems and local circulating parasites in the locality. The survival of Strongyloides larvae depends on the environmental temperature and moisture. The larvae of these species are susceptible to desiccation with the dry areas providing unfavourable environment for survival of Strongyloides larvae [39,40].

The prevalence of 12.6% recorded for A. suum in this study was higher than 4.9% reported from Bishoftu, Ethiopia [19], 3.7% from Turkey [41] but lower than 54.6% reported from Bostwana [16], 17.6% from Korea [31] and 18.5% from Plateau state of Nigeria [42]. The moderately high prevalence of A. suum in the present study might be associated with farm management systems and access of free roaming pig in the environment which facilitates ingestion of thick-shelled eggs of A. suum. These thick-shelled eggs are resistant to adverse environmental factors as well as chemicals and can maintain infectivity for long periods of time [43].

Previous studies by Tomass et al. and Jufare et al. [7,19] from Ethiopia, [40] from Zimbabwe, [15] from Ghana and [4] from China reported T. suis prevalence of 0.3%, 2.9%, 4.7%, 4.6% and 5.2% respectively which is lower than the report of the present study (6.9%). Contrary to this, [44] from West Indies and [45] from Uganda reported a prevalence of 38% and 17%, respectively which is higher than the result of this study. The aforementioned differences in the prevalence of T. suis could be due to the ability of the eggs to survive for long in the environment [46,47].

Oesophagostomum spp. is one of the intestinal parasites of pigs identified in this study, having the lowest prevalence of 3.9% which is consistent with the report of Weng et al. [4] from China (2.5%). However, lower than the report of Abdu and Gashaw [14] from Ethiopia and [10,48] from Kenya with the prevalence of 6.7%, 39.1% and 40%, respectively. Coccidia spp. is the only protozoan observed in this study with a prevalence of 10.5%, lower than 12% reported from Bishoftu, Ethiopia [19], 88% from West Indies [44] and 47.2% from China [4]. The aforementioned differences in the prevalence could be due to differences in the ecological factors between the origin of pigs, differences in management system and the ability of the cysts/oocysts to survive for long in the environment [48].

Fasciola hepatica is the only trematode observed in this study with a prevalence of 11.8%, which is in agreement with findings of Bernard AN et al. [42] in Plateau state of Nigeria (9.3%) while higher than the report of Tomass [7] (2.81%) in Tigray Region of Ethiopia. Factors such as presence of reservoir hosts, presence of snail intermediate hosts and ability of F. hepatica to colonise and adapt new hosts contribute for its spread in livestock in an area [49]. The transmission ecology of our present study areas are not far away from fulfilling the aforementioned epidemiological determinants of fasciolosis in pigs.

This finding is consistent with the earlier reports of Fasil [30] in Ethiopia and Ismail HAHA [31] in Korea. However, our result is higher than the prevalence reported by Tomass [7,19,32] in Ethiopia, [33] in China and [34] in Nigeria. The differences in the prevalence observed between the present study and aforementioned studies could be due to poor management system and lack of veterinary care. Traditional system of management in which pigs are allowed to roam freely or are kept under poor hygienic conditions such as those obtainable in dirty isolated lots or pens encourages helminthiosis [35].

Table 7: The prevalence of adult GIT parasites identified in pigs slaughtered at AAAE based on the recovery by post mortem examination.

<table>
<thead>
<tr>
<th>Parasite</th>
<th>Total</th>
<th>110</th>
<th>28.2</th>
</tr>
</thead>
</table>

NB: In all cases, a total numbers of animals examined were 390.

Discussion

The present study established six GIT parasites ova/oocysts namely, Strongyloides spp, A. suum, T. suis, Oesophagostomum spp, F. hepatica and Coccidia spp. The coproscopical examinations employed for identification of ova/oocyst include zinc sulphate flotation and sedimentation techniques which revealed the existence of parasitosis with overall prevalence of 61.8% of pigs slaughtered in the abattoir. This finding is consistent with the earlier reports of Fasil [30] in Ethiopia and Ismail HAHA [31] in Korea. However, our result is higher than the prevalence reported by Tomass et al. and Jufare et al. [7,19] from Ethiopia, [33] in China and [34] in Nigeria. The reasons for the variations in GIT parasite prevalence among the origin of the pigs might be related to difference in management practice performed or, could be attributed to differences in climate as a result of geographical location. The highest prevalence recorded in grower pigs (65.85%) than in piglet (33.33%) and adult (49.17%) pigs could be attributed to immune status, pre-exposure and probably nutritional status [39]. Induced immunity against parasites re-infection post-exposure is possible in pigs [50].

The present study revealed higher prevalence of GIT parasites in pigs originated from Addis Ababa and its surroundings (54.97%) when compared to Bishoftu (45.19%). The reasons for the variations in GIT parasite prevalence among the origin of the pigs might be related to differences in management practice performed or, could be attributed to differences in climate as a result of geographical location. The highest prevalence recorded in grower pigs (65.85%) than in piglet (33.33%) and adult (49.17%) pigs could be attributed to immune status, pre-exposure and probably nutritional status [39]. Induced immunity against parasites re-infection post-exposure is possible in pigs [50].

Adult pigs are more likely to have accumulated the infection over time which enhances them to develop resistance against re-infections [35,51]. Though there was no significant association between infection rate of GIT parasite and age of the pig, there was higher prevalence in grower pigs than adult and piglet which corroborates the findings of Nosal et al. [52] who also reported higher helminthosis in fatteners, gilts and young sows. A report of Esroney [39] had indicated a significantly lower infection rate in piglets than weaners, growers and adult pigs. The lower infection rates recorded in piglet could be linked to acquired immunity through suckling of milk from their dams or sows [35,53].

The higher prevalence recorded in females than in male pigs can be attributed to more females been sampled, though there was no significant difference between the infection rate of GIT parasites and sex of the host. Our finding is inconsistent with the findings of Shima FK et al. and Tamboura [35,38], who reported that female pigs excreted significantly more numbers of worm eggs in their faeces than male pigs. This area needs an indebt study to unveil the factors responsible for this difference.

The absence of statistically significant association in infection rate between sex, age or origin groups, and the prevalence of pig GIT parasite, except for A. suum ova (in case of origin) (p<0.05) and Coccidia (oocyst) (in case of age and sex) (P<0.05), is an indication that pigs can become infected and develop clinical disease under similar conditions of helminth infections exposure [35]. This could be
due to equal exposure of both sex and all age groups [54]. The significant association (P<0.05) that was observed between infection rates of *A. suum* and source(origin) of pigs could be attributed to differences in management practices i.e., pig populations originating from Bishoftu areas are mainly kept under an intensive production system whereas those from Addis Ababa areas are from both intensive and extensive management system. The association in this study could also be ascribed to dissimilarities in adoption of veterinary care by the pig farmers from their respective areas. Pig farmers in Bishoftu seemed to adopt more to regular deworming and improved nutrition probably due to the presence of a veterinary school in the town and enlightenment received.

The present study also revealed as there was higher monoparasitic infection (37.9%) compared to polyparasitic (mixed) (11.28%) infection. Higher monoparasitic infection in grower pig than in piglet and adult pigs could be attributed to immune status, pre-exposure and probably nutritional status [39]. Higher prevalence of both mixed (polyparasitic) and monoparasitic infection was observed in females compared to male pigs. This could be explained by the fact that males are slaughtered at early age while females are kept for breeding purpose and will have greater chance to acquire infection before they are eventually slaughtered especially for chronic infection like fascioliosis [35].

This study also presented postmortem examination findings by recovering adult parasites from liver, small intestine, colon and caecum. The adult parasite identified overall prevalence was 28.2%. Among the adult parasites identified, *F. hepatica* was higher in prevalence (22.1%) when compared to the overall prevalence of the rest parasites and this is higher than the prevalence reported by Fikiremariam [55] (18.5%) at AAAE, Ethiopia while Egypt(8%), South America(15%) and our neighbour Kenya reported zero prevalence in contrary to this findings [56]. The higher prevalence of this parasite compared to the above mentioned reports have indicated that, the pigs might be grazing around a lot of rivers and swampy area for a long period of time and poor control strategies employed in the origin of the pigs. Commonly water lodged areas favour the existence of snail, intermediate host [57].

**Conclusion**

This study has revealed the existence of six GIT parasites ova (oocysts) namely, *Strongyloides spp.*, *A. suum*, *T. suis*, *Oesophagostomum spp.*, *F. hepatica* and *Coccidia spp.* in pigs slaughtered at AAAE. *Strongyloides spp.* was the most prevalent parasite followed by *A. suum* among the parasites ova (oocyst) identified in this study. The study also established that *A. suum* is significantly associated with origin (source) of pigs while age and sex were significantly associated with the prevalence of *Coccidia spp.* infection rates among the related risk factors. This has exposed the poor quality of husbandry practices and/or inadequate veterinary care given to pigs by their rearers. This study also presented postmortem examination findings by recovering adult parasites from liver, small intestine, colon and caecum in which *F. hepatica* was the highly prevalent parasite identified when compared to the overall prevalence of the rest parasites. Our investigation here provided basic data on the prevalence of GIT parasites and associated risk factors in and around Addis Ababa and Bishoftu areas. The prevalence of intestinal parasites in pigs in these two areas was severe and the infection of intestinal parasites is still an important factor that hinders the development of the pig farming industry. Therefore, the findings here would have important implications to control and prevent intestinal parasite infection in pigs in Addis Ababa and Bishoftu areas.

**References**


