RESEARCH ARTICLE

Larval *Ascaris suum* migration and diagnostic value in pigs

YLLKA (MIJA) ÇANI¹, BEJO BIZHGA²

¹ PhD Candidate, Faculty of Veterinary Medicine, Agricultural University, Tirana, Albania
² Faculty of Veterinary Medicine, Agricultural University, Tirana, Albania

*Corresponding author; E-mail: ylkamia@live.com

Abstract

Study focused on diagnostic alternatives of *Ascaris suum* infection in 162 pigs in slaughterhouse. The range and infestation intensities of *Ascaris suum* infection depend on age, period and method of examination. Coproscopic examinations from 162 samples showed 124 of them (76.54%) positive for *Ascaris suum* eggs. Coproscopic examinations resulted the most efficient and offer the possibility of epidemiological estimates. From the samples were found with injuries as a result of migration process 49 pigs or 30.24% of the sample surveyed. During the macroscopic examination of the intestine of pigs were found with the adult parasite in 78 heads or 48.14% of the examined pigs. This value was about 20% lower than the value of coproscopic examination, but about 20% higher than the value of the examination of the milk liver spots. During of the macroscopic and microscopic examination in lungs were found with signs of pneumonia and parasitic larva migration in the lung parenchyma and the bronchi, 58 heads or 35.8% of the examined pig lungs. In pigs when parasitic pneumonia detected, the nose leaks were examined for the presence and number of larvae. From 162 nose tampons examined resulted positive for the presence of *Ascaris suum* migration larvae 26 pigs (16.04%) from the total of examined heads. Post-mortem examinations in slaughterhouses at pigs resulted efficient, low cost and provide sufficient data for *Ascaris suum* infection.

Keywords: Ascariasis; swine; method; larvae; diagnose.

1. Introduction

*Ascaris suum* is a nematode that infects pigs and randomly it can affect people. *A. suum* is present across in our country and causing major damage to the growth economies of pigs and the disease causes called ascariasis [4, 6, 13, 17]. Adult ascarids living in the small intestine and the mature females produce 100,000-200,000 a day eggs that come along with the feces in the external environment. The male is 15-25 cm long and 0.3-0.4 cm wide, while the female is 25-41 cm long and 0.3-0.6 cm wide. It is a long worm, the shaft-shaped yellow. Mouth are surrounded by three edge equipped with scarring little theeth. Eggs are 50-70x40-50 , they have ellipsoidal shape, thin-walled and small granules. They have brown to yellow colour, are non-segmented and very resistant. Eggs maintain vitality in the land, but can be destroyed by the direct rays of the sun [4, 6, 8, 13, 27]. Eggs newly emerging with the feces are not infestive, they can be transformed invasive eggs when in their place is created the second stage larvae. At the temperature 20 °C they become second-stage larvae and they infest pigs when they eat food or swallow water and invasive eggs, from which the small intestine out of inexpensive stage larvae II, to begin phased hepato-entero-pulmonary migration [10, 12, 15, 17]. The stage II larvae pierce the intestines and enter the blood vessels (veins), beginning their migration to the liver, where they stay 4-5 days and transformed into L 3 larvae that reach the liver through the hepatic veins, pass in vena cava caudalis and the right half of the heart, from which through the pulmonary artery into the lungs arrive 4-7 days after infestation [3, 7, 14]. Pierce blood vessels and walls of the alveoli, hit the alveoli and begin to climb in the airways, continuing movement and assisted by the mucociliary apparatus, the larvae emerge in the pharynx, where together with saliva and bronchial fluids ingested and down to the intestine where it begins the second phase or intestinal stages. The larvae reappear on the day of the casing 8 and 9 after
infestation there doing stripping III and transformed into L4 and around day 30 to make stripping IV and transformed into L5. The entire cycle of pig organs lasts 60-70 days and the life of A. suum lasts about one year [1, 9, 21]. A. suum exists everywhere where pigs grow and the level of infestation ranges routine from 20-70%. Infestation can be caused at all ages, but more serious are age 1-5 months. More infested are the pigs who do not eat well, and when lacking hygiene is bigger [12, 23, 27]. The source of the disease are infested pigs. The greatest danger comes from manure from stalls without leave and employees who can spread the eggs wherever they move [1, 4, 6].

2. Material and Methods

The examinations were conducted in 162 pigs in the slaughterhouse. Scope of work during coproscopic examination was to determine the prevalence and parasite load of A. suum in pigs in the slaughterhouse according to epidemiological alignment criteria, sampling and evaluation [2, 4, 6, 17, 23]. Fecal samples were taken directly to the right intestine which often were completely campionated. In this case the right hose broke away from the rest connected on both sides and the plastic bag was transported in laboratory. For coprologic examinations were used qualitative and quantitative methods of sedimentation and flotation [4, 6, 17]. Examinations post mortum to the peculiarities of biology A. suum highlighted changes in the lungs and the liver and damages during the phase of hepato-pulmonary migration of slaughtered pigs in the slaughterhouse. These surveys were carried out in these organs which often were sampled completely. We routinely by these organs were sampled and samples for macroscopic, histological and microscopic examination [11, 12, 15].

2.1. Procedures at slaughter and post mortum examinations

In slaughterhouses in livers of piglets was conducted evaluation of the milk spots. Livers were carefully observed for the evaluation of hot spots due to migration of the ascarids larvae [6, 12, 16, 18, 22]. To differentiate parasitic stains from stains caused by fungi and bacteria samples from the liver in the laboratory were stained with Wright Gimsae and Ziehl Neelsen [16]. In the same piglets were observed also the lungs. After an observation of parasitic pneumonia or suspected cases of migration of larvae in the lungs when the hemorrhagic lesions were noted and eosinrophils infiltration around alveoli (the larvae migrate to the bronchial tree) were noted hemorrhage, edema and emphysema [3, 8, 13, 25]. Lungs resulting suspicious or affected, were sampled from damaged areas, or to be fully examined in the laboratory. In lab full lungs were examined with perfusion method [17, 25, 28]. As for the debris became microscopic examination of smears prepared by the fluid in the bronchial tree. At the slaughterhouse was prepared swabs from the nose leaks from all piglets that were used in the experiment [3, 14, 19]. Tampons were observed to find migratory larvae. In cases when larvae were found calculates their number. To observe, intestines were divided into several parts by ligature and were cut into pieces 1-2 meters long and trasported introduced in plastic boxes. For examination of the intestine parts were washed in pure water and the water was collected and was surveyed after sedimentation [2, 7, 21]. After each rinse portion of the intestine was opened by enterotom was surveyed and the interior to discover fixed worms mucus. To be separated from the mucous membrane do not retreat with pliers but torn mucous fixed around the country to favor secession. Content and mixed water filtered and the remaining filter disposed in a container to be examined [7, 9]. In the lab was raided all bowels and sediment rinse was tested on a glass tray located on a black sfod. For detection of small nematode was used artificial digestion and accomplished overnight in thermostat at 37°C. After that was observed with low magnification dissolved material from which were separated parasites [6, 17, 21, 26]. During micro and stereomicroscopic examination was observed, collected, differentiated and counted young and adult
parasites in the intestines of examined piglets [1, 3, 5, 24, 28]. Coproscopic examinations, the nasal and the majority of the organs were performed in the laboratory of veterinary parasitology, FVM.

3. Results and Discussion

Coproscopic examinations were conducted with alterations of the method of sedimentation and flotation (Mc Master). In 72 (44%) stool samples from the intestine (rectum and right intestine) were applied to both quantitative methods for the same sample [2, 4, 17, 23].

Table 1. Results of post-mortem examinations of pigs in the slaughterhouse.

<table>
<thead>
<tr>
<th>No</th>
<th>Examination method</th>
<th>Sample piglets no</th>
<th>Positive no</th>
<th>Positive %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coprology</td>
<td>162</td>
<td>124</td>
<td>76.54</td>
</tr>
<tr>
<td>2</td>
<td>Milk spots</td>
<td>162</td>
<td>49</td>
<td>30.24</td>
</tr>
<tr>
<td>3</td>
<td>Larval pulmone migration</td>
<td>162</td>
<td>58</td>
<td>35.8</td>
</tr>
<tr>
<td>4</td>
<td>Nasal swabs</td>
<td>162</td>
<td>26</td>
<td>16.04</td>
</tr>
<tr>
<td>5</td>
<td>Ascaids in intestine</td>
<td>162</td>
<td>78</td>
<td>48.14</td>
</tr>
</tbody>
</table>

Table 2. Parasitic load under quantitative coproscopic examinations.

<table>
<thead>
<tr>
<th>Examination method</th>
<th>Sample piglets no</th>
<th>Average e/g/f</th>
<th>Variations e/g/f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parasitic loud</td>
<td>162</td>
<td>168</td>
<td>10-1800</td>
</tr>
</tbody>
</table>

From coproscopic examinations were found the highest values of the infestation of *Ascaris suum* in piglets. The data confirm that coproscopic study regardless of the method applied is most successful methods for diagnosing ascariasis in piglets. It is fast, easy and low cost. From 162 samples examined (coproscopy) 124 of them (76.54%) resulted positive for *Ascaris suum* infection [4, 6].

From coproscopic observations average parasitic load in piglets resulted in 168 e/g/f with 10-1800 e/g/f variations. During post-mortem inspection knowing the peculiarities of *A. suum* biology, examinations were carried out in the liver, lungs, nose and intestines. These surveys were carried out in slaughterhouses and by the same piglets that served as the basis of this study. From samples, were found with injuries as a result of liver migration 49 piglets or 30.24% of the observed samples. These injuries are known as "milk spots" in the liver. This was the main characteristic of a chronic hepatitis caused by parasitic *Ascaris suum* larvae migrans. The spots are the result of larval migration within the liver. These migratory injuries were noted in about one third of the pigs examined. Liver examination for "milk spots" is valid and provides enough information for the particular observations may be made in the slaughterhouse [4, 6, 12, 16, 26]. Examination is easy and free of cost and status is sufficient to approval conclusions for the ascarids pathology in piglets. The opposite applies to the method negativity. Negativity should be reconsidered and evaluated carefully, as not all affected piglets may have the presence of milk spots in the liver. The data from the study showed that only about a third of pigs affected by milk spots in their liver. These milk spots are classified in three models based on the macroscopic appearance. Histologically the following three types of lesions are seen: interstitial hepatitis and eosinophilic intralobular necrosis, arteriolar degeneration and granuloma, and lymphofolicular hyperplasia. Regarding the relationship between macroscopic and histological patterns, compact milk spots are generally manufactured by interstitial eosinophilic hepatitis [6, 12, 16, 17]. With the naked eye, microscopic
observations and histopathology were observed milk spots in the livers of pigs in the slaughterhouse. Livers of piglets positive for milk spots were brought to the laboratory for thorough examination. Liver samples resulting with milk spots belonging to all ages of pigs 2-7 months. Lesions were in diameter between 0.5 and 1 cm distributed in whole liver parenchyma and infiltration in hepatic parenchyma. Often larvae were noted in the parenchyma, or migrate freely. In cases of chronic forms of larvae resulted in dead and blocked abscesses or granulomas. For differentiated parasitic stains, or stains caused by fungi and bacteria samples from the liver were stained with Wright Gimsae and Ziehl Neelsen [12, 16]. During entero-hepato-cardio-pneumo-intestinal migration in tissues where larvae pass, causing bleeding and increased volume of organs and necrotic spots. Lung larvae are reared and cause multiple hemorrhages in the alveoli, the bronkiola, east of edema and parasitic pneumonia in pigs [3, 6, 12, 19]. The larvae produce toxins that act and other organs of piglets. Lung larvae are reared and cause multiple hemmorhages in the alveoli, bronchials, east of edema, formation of parasitic pneumonia which is present in piglets. From samples examined were found to damage as a result of migration in the lungs 58 piglets or 35.8% of the observed samples. These migratory lung damage resulted in about 5% higher than milk spots that were noted in about one third of the pigs examined. Lung examination for the presence of migratory pneumonia resulted more efficient examination of the liver and provide sufficient data for observations in slaughterhouses [6, 12, 19, 21, 22, 26]. The larvae migration to the lungs are capable of causing an inflammatory reaction, destruction of pulmonary tissue and parasitic pneumonia with hemorrhagic foci. This is followed by an intensive infiltration of eosinophils. These lesions are visible at necropsy on the lung surface as white areas and are clearly separated from the healthy part of the body. In these cases were found migrating larvae of A. suum [6, 12, 19]. In piglets from leaks nose in 162 piglets were taken tampons in their noses and were prepared to microscopic smears. Microscopic swabs were observed in stereomicroscopes and microscopes as wet and dry preparations. The technique proved to be very present when it is known that the larvae appear on the nose of the pig infested on day 7 and 9 after infestation. Larvae in the nose and mouth swallowed into the gut or leaving by sneezing or runny nose in the external environment. All samples proved positive for migratory larvae of A. suum. Swabs diagnostic technique proved to be very simple, extremely efficient and the very fruitful outcome [14, 19, 23]. Work is underway to convert into quantitative technique for estimating the number of larvae and other parasitic estimates. From 162 examined tampons tested positive for the presence of larvae 19 piglets or 15.83% of the total examined tampons. This is the lowest value recorded for the same piglets category. The reason is the method fragility and biological features of Ascaris suum which only for a short period of time can be found in the nasal leakage. This is the period when he comes in after the migration bronchioles and mucusciliary apparatus comes in the mouth to swallow or nose to be removed with leaks in the external environment [6, 19]. This time is limited and therefore values and will be smaller. The advantage of the method is that the examination method may bring valuable data and the alive piglets (not necessarily killed) and status and parasitic loads are more value [6].

Table 3. Parasitic loud under quantitative nasal tampon examinations.

<table>
<thead>
<tr>
<th>Examination method</th>
<th>Samples no</th>
<th>Average l/ml</th>
<th>Variations l/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal swabs parasitic loud</td>
<td>162</td>
<td>2.5</td>
<td>1-12</td>
</tr>
</tbody>
</table>

In our case average parasitic loud was 2.5 larva per ml found that the method was converted into quantitative method and the number of larvae per ml ranged in values 1-12 l/ml. In these piglets was
performed and intestinal observation to find and count increased ascarids. While mature parasites were found in the intestines of 78 piglets or 48.14% of the observed samples [6, 13]. To resist intestinal descending flow they stare ends of their body in the intestinal mucosa and the damage it mechanically. When numerous they block the movement of food and cause measures extensions, twisting, gut cracks and east of peritonitis. They can climb in the stomach and cause nausea. They absorb large amounts of protein and food stuffs [1, 6, 12, 19, 21, 23, 28].

4. Conclusions

Coproscopy resulted in successful methods for diagnosing ascaridiasis in piglets. It is the fast, easy and low cost. Of 162 samples examined 124 of them (76.54%) resulted positive for Ascaris suum eggs. From coproscopic observations average parasitic load in piglets resulted in 168 e/g/f with 10-1800 e/g/f variations. The migratory damage (milk spot) was seen in about 1/3 of the liver of the piglets examined, while in coproscopy were identified 76.5% of the samples taken in the same piglets. The difference is explained by the features of the biological cycle of the parasite and the specificity of the immune piglets. Lung examination for the presence of migratory pneumonia resulted in the efficient examination of the liver and provide sufficient data for observations in slaughterhouses. From samples examined were found to damage as a result of migration in the lungs 58 piglets or 35.8% of the observed samples. These migratory lung damage resulted in about 5% higher than milk spots. From 162 examined tampons tested positive for the presence of larvae 19 piglets or 15.83% of the total examined tampons. This is the lowest value recorded for the same piglets category. The reason is the fragility of method and biological features of Ascaris suum. While were found positive for askarids in the small intestine about 50% of the examined piglets. Control of liver and lung where they are visible signs of pneumonia migration and the presence of invasive larvae, can be applied as successful diagnostic techniques for the diagnosis and monitoring of post-mortem swine ascaridiasis. While nasal examinations in young piglets can be used as an alternative method for the diagnosis and monitoring of ascaridiasis.

6. References


