GASTEROPHILUS SP. BOTFLY LARVAE IN HORSES FROM THE SOUTH-EASTERN PART OF POLAND

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Abstract

In 2006, 725 horses aged 8 months to 16 years from different farms from the southern-eastern part of Poland were examined post-mortem for the presence of botfly larvae. One hundred and four horses (14.75%) demonstrated the presence of botfly larvae. An average infection rate was 52 larvae but low rate dominated. The larvae found belonged to Gasterophilus intestinalis and Gasterophilus nasalis. The 3rd instars dominated in the infected horses; however, more than 25% of the horses harboured both 2nd and 3rd instars.

Key words: horses, Gasterophilus, infection, extensiveness, intensiveness, Poland.

The prevalence of botfly larvae in animals poses a serious epizootic and economic problem in several world areas. In Poland, studies involving the extensiveness of Gasterophilus larvae infections in horses are not numerous, although many more reviews and casuistic reports have been published worldwide (6, 7, 10-14, 16, 18, 19, 21, 22, 25-28, 30, 32, 33). Reasons for such a situation should be sought both in difficulties in intravital diagnosis of the infection and a belief in the low pathogenicity of Gasterophilus larvae.

Horseflies of the genus Gasterophilus belong to the Oestridae family. In Poland, four species, including Gasterophilus intestinalis, G. nasalis, G. haemorrhoidalis, and G. pecorum, were described. Matured Gasterophilus horseflies are hairy, 9 mm to 16 mm in length, yellow-brown-black, dark-brown, yellow-rust or black coloured tachina flies. They have a regressive mouth apparatus and do not take feed from the environment. Inseminated females lay eggs on horse hair except for G. pecorum, which lay eggs on plants. Larvae at the first stage reach the oral cavity of horses passively (G. intestinalis, G. pecorum) or actively. The larvae stay in the oral cavity for some time, and are then followed by instars, and as larvae at the second stage inhabit typical sites such as the stomach and duodenum where they grow and transform into the third stage larvae, which leave the host after a few months and then metamorphose into chrysalis from which insects emerge into the environment.

The aim of these studies was to evaluate the extensiveness and intensiveness of the infection of Gasterophilus botfly larvae in horses from the southern–eastern part of Poland.

Material and Methods

In 2006, the stomach and small and large intestines from 725 horses aged 8 months to 16 years were collected for parasitological purposes. All the horses originated from different farms in the southern–eastern part of Poland and were killed at the slaughterhouse. The collected organs were examined for the presence of botfly larvae, their localisation, species, and instar stages. Differential diagnosis was performed on the basis of larva morphology and its developmental stages described by Draber-Mońko (7).

Results

The larvae of botflies were found in 104 (14.75%) of the 725 horses. The rate of infection ranged from 1 to 905 botfly larvae (an average of 52 larvae). The larvae were found only in the stomach and small intestine and belonged to Gasterophilus intestinalis and Gasterophilus nasalis (Figs 1 and 2). The data concerning the distribution of the larvae in the gastrointestinal tract of the horses are shown in Table 1.

The majority (88.88%) of Gasterophilus intestinalis larvae were found to be attached to the mucous membranes of the stomach. Markedly less larvae (7.79%), which belonged to Gasterophilus nasalis, were presented on the mucous membranes of the small intestine. Few larvae were found in the contents of the stomach (2.09%) or small intestine (1.23%).
Fig. 1. Individual botfly larvae on the stomach mucosal membrane.

Fig. 2. Clusters of numerous botfly larvae on the stomach mucosal membrane.

Fig. 3. Crater-like alterations in the stomach mucosal membrane.
Table 1
Distribution of botfly larvae in the gastrointestinal tract in 104 infected horses

<table>
<thead>
<tr>
<th>Organ</th>
<th>Mucous membrane</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of horses (%)</td>
<td>Mean (min-max)</td>
</tr>
<tr>
<td>Stomach</td>
<td>98 (94.23)</td>
<td>49.36 (1-723)</td>
</tr>
</tbody>
</table>

Table 2
Frequency of botfly larva occurrence in selected brackets in infected horses (N=104)

<table>
<thead>
<tr>
<th>Number of larvae</th>
<th>Infected horses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>1 - 10</td>
<td>54</td>
</tr>
<tr>
<td>11 - 50</td>
<td>21</td>
</tr>
<tr>
<td>51 - 100</td>
<td>14</td>
</tr>
<tr>
<td>101 - 500</td>
<td>14</td>
</tr>
<tr>
<td>More than 500</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3
2nd and 3rd instars in infected horses (N=104)

<table>
<thead>
<tr>
<th>Larvae</th>
<th>Number of horses with larvae (%)</th>
<th>Number of larvae</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min-max</td>
</tr>
<tr>
<td>II stage</td>
<td>28 (26.92)</td>
<td>1-453</td>
</tr>
<tr>
<td>III stage</td>
<td>103 (99.04)</td>
<td>1-456</td>
</tr>
</tbody>
</table>

The frequency of intensiveness of infection in defined ranges is shown in Table 2. More than half the infected horses demonstrated a few larvae (10 or less). The highest rate of infection included 905 larvae; of these larvae 723 were attached to the mucous membrane of the stomach, 171 to the mucous membrane of the small intestine, and 11 were found in the contents of the stomach.

The mucous membranes of the stomach demonstrated crater-like alterations caused by botfly larvae (Fig. 3). These alterations occurred in the spots from which the larvae were removed mechanically and in the spots showing the traces of their presence. However, no visible macroscopic changes on the mucous membranes of the small intestine were found at the site of the larvae localisation.

The post mortem examination of the horses revealed the occurrence of 2nd instars of Gasterophilus sp. larvae in a little more than 25% of the infected animals; however, the 3rd instars dominated. The 3rd instars larvae were not found only in one infected horse. The data are shown in Table 3.

Discussion

The extensiveness of botfly larva infection in horses in Poland since the fifteenth year of the 20th century varied with regard to regions, and ranged from 33% to 88.4% (7, 12, 19, 30, 33). Moreover, gasterophilosis is one of the most abundant parasitosis, affecting from 8.4% to 52.8% of the horse population (16, 18, 21, 22).

Our results indicate that the prevalence of nearly 15% gasterophilosis reported in horses from the south-eastern part of Poland is similar to that found in our earlier examinations (16), including horses from the same region and twice as high as that reported by Kornaś et al. (18) in horses from the Voivodeship of Malopolska. It should be also stressed that a much higher extensiveness of botfly larva infection, amounting up to 40%-50%, was evidenced in horses from the central and north-eastern parts of Poland.

In other countries, the extensiveness of botfly infection ranged from 9% to 99% including 53% in England and Wales (9), 58% in Belgium (1), 34% in France (2), 43% in Ireland (31), 9% in Germany (24), 65% in Switzerland (3), 12.3% in Sweden (17), 82.2% in Italy (20), and 98.7% in Kentucky, USA (8).

It seems that the extensiveness of infection is affected by several factors. However, it is difficult to determine those which cause a clear differentiation in the rate of infection between the horses from the northern and southern areas of Poland. It may be suggested that the maintenance of horses is one of the main factors influencing the prevalence of gasterophilosis (12, 16, 18). In the south-eastern part of Poland, alcove breeding, involving limited access to pastures and short-term keeping in individual paddocks, dominated until recently. This breeding decreased the extensiveness of infection by limited contact with female botflies.

The climate of the region seems to be another factor creating the prevalence of Gasterophilus sp. However, it is difficult to assess unambiguously the climate influences on the various extensiveness of Gasterophilus sp. infection in horses from south-eastern, central, and the north-eastern part of Poland (7, 26). It is well known that botflies are considered as relatively stenothermal parasites and matured females need warm, sunny, and windless weather. There is no doubt that a higher extensiveness of Gasterophilus sp. infection is reported in warmer countries (4, 8, 20, 23). Moreover, the extensiveness of the infection may be also influenced by the age and sex of examined horses; however, results reported by several authors are not consistent (1, 7, 20, 26).

It appears that the preparations containing macrocyclic lactons (ivermectin and moxidectin), applied commonly and successively over decades for deworming in horses, may have decreased the rate of botfly larva infections. The above suggestion is
supported by recent observations showing a decreasing extensiveness of the infection in comparison to that in the post-war period. The problem was not stressed in previous publications.

The number of botfly larvae in horses seems interesting. Our examinations revealed that the intensity of infection in horses from the south-eastern part of Poland was low - from 1 to 10 larvae (about 50% of infected horses) whereas 15% of horses suffered a high infection - from 100 to 905 larvae. The mean larva intensity (52 specimen) was similar to that (46-0 larvae) reported by other Polish investigators (12, 18, 22, 30).

The data reported by researchers from other countries show a higher intensity of infection, which may result from different climate conditions. For example, the mean intensity of infection in Italy was 108 larvae but in Kentucky (USA) 168 larvae. On the other hand, in Belgium the intensity of infection ranged from 1 to more than 200 larvae, whereas the majority of horses were infected with 1 to 50 larve (67%) (1).

Our examinations revealed that the large majority of larvae were attached to the mucous membrane of the stomach and duodenum as a result of the various species statuses of the parasites (5, 9, 29). Few larvae were also found in the contents of the stomach. Because the post-mortem examinations were carried out shortly after slaughter it may be assumed that the larvae found were migrating. Low-rate infections frequently noted in our examinations had a small negative effect on the functioning of the gastrointestinal tract. However, the literature data and our observations indicate that the rate of infection involving hundreds of larvae may exclude a vital part of the stomach or small intestine from normal functioning and lead to disturbances in the digestive processes.

Moreover, it should be stressed that in some cases individual larvae may injure the stomach or intestinal wall at the site of attachment, producing a gateway for the penetration of viral, bacterial or mycotic pathogens (5, 15, 22, 29).

More than 25% of infected horses from the south-eastern part of Poland had 2nd and 3rd instars of Gasterophilus sp. and the presented results seem to be seasonally dependent. Similar data were reported by Pawlas et al. (22).

Our results confirm that gasterophilosis in horses remains a problem from the invasiological point of view. Although clear clinical signs are rarely seen during the course of the disease, the parasites may directly or indirectly influence the health and performance of horses. Hence, this infection should be considered in the programmes including plans for parasite eradication.

References

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