

Aspects of the evolutive cycle and histological modifications in the experimental infestation with *Trichinella spiralis*

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SUMMARY. The experimental infestation with *Trichinella spiralis* was performed on a number of 30 mice and 30 rats SPF by oral administration of 600, respectively 900 larvae. The test animals were sacrificed in 10, 12, 18, 21 and 30 days after infestation (p.i.). Samples were taken from striate muscles for trichineloscopic examination, and others from the organs for histopathological examination.

The larvae reach certain muscles in 12 days p.i. (small, recurved larvae, found in the meat juice around the examined fragments). In 18 days p.i. the larvae are big and have recurved extremities; in 21 days the process of spiralling and the shaping of the capsule begins. In 25 days p.i. the cyst capsule is obvious and the larvae are spiral; in 30 days the cysts are completely formed having 1 or 2 spiral larvae.

The histological modifications induced by experimental infestation are: hyperplastic enteritis, hyperplastic lympho-reticulitis in the mesenteric lymphonodules, myocardosis and interfibrillar hemorrhage, the congestion of centrolobular veins and of the sinuous capillaries, hemorrhagic alveolitis, pulmonary edema and compensatory emphysema, interstitial hemorrhagic nephritis and tubulo-nephritis.

Introduction

Trichinellosis is a cosmopolitan zoonosis which affects numerous domestic and wild mammals as well as humans, being produced by nematodes of the genus *Trichinella* which develop in the intestine (adult stage) and in the striate musculature (larval stage) within the same host.

The illness evolves with evident symptoms in humans expressed by digestive disturbances, the alteration of the general mood, fever, edema, muscular pains followed sometimes by a lethal ending. With animals it evolves asymptotically, the main sources of contamination being the synantropic animals (swine, rodents, equine, carnivora) and in the forest fauna – the wild boar, the bear, the badger and the fox.

In our country trichinellosis is one of the most serious zoonosis being in the attention of the medical specialists as a result of its sanitary, social and economic implications following the increased incidence of helminthosis in humans,

swine and other species of domestic and wild mammals.

Materials and methods

The researches were performed on a lot of 30 mice SPF line BALB/C aged 15-20 days, 25-30 gr. in weight and on 30 rats SPF line W1 aged 15-20 days, 85-100 gr. in weight, infested experimentally by oral administration of 600, respectively 900 larvae of *Trichinella spiralis*.

The larvae suspension (inoculus) for the experimental infestation was obtained by artificial digestion of the fragments of striate muscles of swine with natural infestation diagnosed by trichinelloscopic examination.

The testing animals were sacrificed at different time intervals after infestation, respectively 10, 12, 18, 21, 25 and 30 days. Samples were taken from striate muscles: abdominal, psoas, diaphragm pillier, maseter, tongue, intercoastal, and trichinelloscopic exam was performed in order to render evident the presence of the larvae and of the process of cyst formation.

For the histopathological examination samples were taken from organs and tissues – striate muscles, the small intestine, mesenteric lymphonodules, liver, heart, lung and kidney. The samples were fixed in a solution of neutre saline formol 10%, and processed histologically, whereas the displayed sections were coloured by the HE method and trichromic Gömöri.

Results and discussions

Aspects of the evolutive cycle in the experimental infestation with *Trichinella spiralis* in mice and rats SPF are presented in Table 1.

With the testing animals sacrificed in 10 days after experimental infestation the presence of the larvae in the examined muscular masses was not noticed.

The migration of the larvae from the small intestine to the striate musculature is achieved in 12 days. The larvae present in small number in the striate muscles are of small dimensions, with a slightly recurved aspect, found out in the meat juice around the examined fragments. With rats, the presence of larvae was traced only in the muscles of the tongue, whereas with mice, it was traced in the tongue, the masefer and abdominal muscles.

In 18 days after infestation the presence of a great number of larvae was evident, having big dimensions, recurved extremities, sometimes arch-like and some other times resembling the letter C. With mice there were larvae in the tongue, the masefer and the diaphragm pillier, whereas with rats, in the tongue, psoas and pillier muscles.

In 21 days after infestation the presence of the larvae is noticed with mice in the tongue, pillier, psoas and the abdominal muscles, whereas with rats in the tongue, masefer, pillier and abdominal muscles. The larvae present a beginning of spiralling, being surrounded by an incipient shaping of the cyst capsule.

In 25 days after experimental infestation the number of the larvae in the muscular masses is very great with mice (70) in the tongue muscles, the masefer, pillier, psoas and abdominal muscles. With rats the presence of the larvae (29) was noticed in the tongue, masefer, abdominal

and pillier muscles. The cyst capsule is evident and the larvae are spiral and inside the cyst.

In 30 days after infestation the presence of a great number of cysts (99) is noticed with mice, in the tongue, masefer, pillier and abdominal muscles, whereas with rats, within the same muscular masses, the presence of a smaller number of cysts (21) was noticed. The cysts of *Trichinella* contain one or two spiral larvae and the capsule is evident. The capsule with a granulomatous character, completely formed, is emphasized in the sagittated section of the cyst located in the psoas in 30 days p.i. with the mice; the image shows the presence of the external membrane represented by the inflammatory reaction of the fibroblasts, macrophages and eosinophils cellular elements.

During the lymphohematogene migration of the larvae from the intestinal lumen to the level of the striate musculature, they have an initial length of 80-120 μ and are 5-6 μ thick. On the 10th day after infestation the dimension of the larvae reaches 450/17-20 μ . Soulé and collaborators (1991) mention that in 24 hours after the larva enters the muscle fibre it doubles its dimension.

The momentum of the larvae appearance in the muscles varies between 6 days after infestation (Thomas, 1965) and 18 days p.i. (Amelung, 1952), quoted by V. Ionescu in 1995.

With the mice and rats SPF the larvae of *Trichinella spiralis* reach the striate muscles in 12 days p.i. The larvae go through the sarcolemma of muscle fibre with the help of buccal stylet and by the intervention of some histolitic enzymes placing themselves under the sarcolemma along the myocyte.

In 17 days after infestation the existent larvae in the musculature starts curving in the form of the letter U (V. Ionescu, 1995).

In our research, in 18 days p.i. we noticed: the recurving of the larval extremities, their arch-like disposal or resembling the letter C, the larvae being of very big dimensions compared with those noticed in the muscles in 12 days p.i.

The stage of larvae spiralling is produced between the 21st and the 35th day from infestation (V. Ionescu, 1995). The beginning of the

spiralling process of the larvae present in the striate muscles was noticed with mice and rats beginning with the 21st day p.i. and ended on the 30th day p.i.

At the level of the small intestine (jejunum) a necrosis of the intestinal epithelium was noticed as well as a congestive reaction, lymphohistiocytic infiltration in the chorion of the intestinal villosity – lesion of hyperplastic enteritis.

In the mesenteric lymphonodules hyperplasia of the cortical zone was noticed, accompanied by the invasion of perifollicular sinuses with lymphocytes, macrophages and reticular cells characterized by the absence of the limitation of lymphoid follicles (hyperplastic lymphoreticulitis).

In the myocardium one can notice interfibrillar hemorrhages and lesions of myocardosis, following the toxic action of the parasite (larval stage and adult).

In the hepatic parenchyma one can notice the congestion of centrolobular veins and sinusoid capillaries.

The lesions noticed in the lung are of hemorrhagic alveolitis, pulmonary edema and compensatory pulmonary emphysema.

The lesion of hemorrhagic interstitial nephritis is present both in the cortical zone and in the medullar one accompanied by tubulo-nephritis.

Conclusions

1. The presence of the larvae of *Trichinella spiralis* of small dimensions with recurved aspect in the striate muscles is recorded in 12 days after experimental infestation.
2. In 18 days p.i. the larvae present in the muscles are big and have recurved extremities.
3. In 21 days p.i. the larvae start the spiralling process and the initial shaping of the capsule.
4. In 25 days p.i. the larvae are characteristically spiral and the capsule becomes evident.
5. In 30 days p.i. the cysts are completely formed containing 1-2 spiral larvae.
6. In the small intestine the lesion of hyperplastic enteritis is evident.
7. The lesion of hyperplastic lymphoreticulitis is present in the mesenteric lymphonodules.
8. In the myocardium one can notice interfibrillar hemorrhages and lesions of myocardosis following the toxic action of the parasite.
9. The congestion of the centrolobular veins and of the sinusoid capillaries are noticed in the hepatic parenchyma.
10. In the lung hemorrhagic alveolitis, edema and compensatory pulmonary emphysema were emphasized.
11. Hemorrhagic interstitial nephritis is present in the cortical and medullar zones, accompanied by tubulo-nephritis.