Acta Scientific Veterinary Sciences (ISSN: 2582-3183)

Volume 4 Issue 12 December 2022

Research Article

The Parasitic Hotbeds of the Main Helminths of the Domestic Carnivores and their Gis Mapping ın the Territory of Azerbaijan

R Sh Ibrahimova*

The Institute of Zoology, National Academy of Sciences of the Azerbaijan Republic; Str. A. Abbaszadeh, Azerbaijan

***Corresponding Author:** R Sh Ibrahimova, The Institute of Zoology, National Academy of Sciences of the Azerbaijan Republic; Str. A. Abbaszadeh, Azerbaijan.

Received: October 03, 2022

Published: November 04, 2022

Abstract

The domestic carnivores (stray dogs, domestic cats) have a significant role in the transmission of helminths, dangerous to humans and domestic animals, from natural and mixed hotbeds to synanthropic one, and in the creation and permanent maintenance of strong parasitic hotbeds. Due to the favorable conditions in the various areas, the density of the animals increases which makes animals more vulnerable to certain types of the helminths and infect one another repeatedly. As a result of the repeated infections, a constant interchange goes on among animals, so that a source of the infection always remains in the areas and natural "parasitic hotbeds" are formed. Existence of a parasitic hotbed in nature is too periolous as it is likely to infect humans and domestic animals. For degree of hazard, 13 species (*D. latum, D. caninum, E. granulosus, T. hydatigena, M. multiceps, A. multilocularis, Tr. spiralis, D. repens, A. caninum, U. stenosephala, T. leonina, T. canis, T. mystax*) of the helminthiasis found in the domestic carnivores were included in the group of the principal helminthiasis infectors whereas the helminthiases they infect were classified as principal helminthiases (diphyllobotriosis, dipilidiosis, exinococcosis, cysticercosis, senurosis, alveococcosis, trichinellosis, dirophiliariosis, ancylostomatosis, unsinariosis, toxocarosis). GIS map zone prevalance of the helminthiosis infectors in the territory of Azerbaijan have been designed by comparative geographical method, and parasitic hotbeds of the principal helminthiosis infectors of the domestic carnivores. As per the prevalence rate of the principal helminthiasis infectors in the regions and GIS mapping of their parasitic hotbeds, it was found out that, some helminthiasis infectors created single hotbed whereas some made mixed ones on a local scale. The study of the effects of each of the factors contributing to the formation of the parasitic hotbeds and GIS mapping of such hotbeds have been of practical importance and are relevant to the modern age. As a result of long-term parasitological studies, it was found out that, the domestic carnivores, their intermediary hosts and anthropogeneous factors have a considerable effect on creation and spread of the natural, synanthropic and mixed parasitic hotbeds of hazardous helminthes in the regions.

Keywords: Stray Dogs, Domestic Cats, Pathogenic Helminths, Parasitic Hotbeds, Extensivity, Gıs Maps

Introduction

The eco-geograpical, vegetative and land cover characteristics of the Republic of Azerbaijan have enabled widespread prevalence of the various domestic and wild mammals, birds, rodents, reptiles and insects in these areas.

The domestic carnivores have a significant role in transmission of helminthiasis hazardous for human and domestic ruminant animals from natural and mixed hotbeds to synanthrope hotbeds, and in creation and permanent storage of the intense parasitic hotbeds [1].

The dependence of the domestic carnivores on the area where they feed cause the formation of local hotbed of these pathogenic helminths.

There is information on natural hotbed rotation of helminths found in dogs when studying the stray dogs in Azerbaijan and

natural and synanthrope hotbeds of the principal helmintiosis infectors of the domestic carnivores [2,3].

According to references, there are far more than 30 infectious and invasive disease hotbeds of the wild and domestic animals in the CIS countries. There is some information on natural hotbeds of the helminthioses in Russia [4-9].

The study of the effects of each of the factors contributing to the formation of the parasitic hotbeds and GIS mapping of such hotbeds have been practical importance and are relevant to the modern age.

Purpose of the work: to identify of the territories of the parasitic hotbeds and compile their GIS maps.

- **Work tasks:** to identify the main helminths of the carnivores; find out the formed parasitic hotbeds in the territories; to identify the extensiveness of the invasion; study the distribution of the helminths; find out the influence on the factors on the forming parasitic hotbeds; compile GIS maps.

Materials and Methods

During 1998-2019 years 980 domestic cats, 628 stray dogs were examined by helminthological and scatological methods to identify the parasitic hotbeds of domestic carnivores' helminths. The species identification of *Trematoda, Cestoda,* and *Acanthocephala* was performed with the use of mount preparations stained in the carmine alum solution. In order to identify the nematode species, they were cleared with the mix solution of the lactic acid and glycerin in a volume ratio of 1:1. In order to identify the helminth species, Olympus microscope with magnification of x20 and x40 were used.

The trematodes, cestodes, and acanthocephalus were fixed in 70% alcohol, while the nematodes were preserved in 4% formalin.

Discussions

For degree of hazard, 13 species (*D. latum, D. caninum, E. granulosus, T. hydatigena, M. multiceps, A. multilocularis, Tr. spiralis, D. repens, A. caninum, U. stenosephala, T. leonina, T. canis, T. mystax*) of the helminthiasis found in the domestic carnivores were included in the group of the principal helminthiasis infectors and were classified as principal helminthiases (diphylobotriosis, dipilidiosis, exinococcosis, cysticercosis, senurosis, alveococcosis, trichinellosis, dirophiliariosis, ankylostomatosis, unsinariosis, toxocarosis (*T. leonina, T. canis, T. mystax*)) [10].

Regions Helminth species	Greater Caucasus region	Lesser Caucasus region	Natural region of the Kura	Natural region of the Lankaran
Diphyllobothrium latum Lühe	7 copies	_	8.9	_
Dipylidium caninum Lühe	53.4	48.7	41.3	40.4
Taenia hydatigena Pallas	39.7	38.3	33.7	35.3
Multiceps multiceps Leske	23.7	9.3	12.9	18.4
Alveococcusmultilocularis Leuckart	24.3	27.8	13.2	11.4
Echinococcus granulosus Batsch	37.8	36.7	22.3	27.8
Trichinella spiralis Owen	19.7	5.2	6.4	8.3
Dirofilaria repens Railliet et Henry	23.2	18.7	27.1	25.3
Ancylostoma caninum Ercolani	53.1	49.7	41.2	43.4
Uncinaria stenocephala Railliet	53.4	48.3	42.5	39.7
Toxascaris leonina Linstow	51.2	50.1	23.7	35.1
Toxocara canis Werner	38.1	19.4	41.2	21.3
T.mystax Zeder	12.1	33.7	14.6	21.7

Table 1: The infection of the domestic carnivores with the main helminths in the different regions of Azerbaijan (in %).

Note: The extensiveness of the helminths is summarized by region and shown in 4 large provinces.

2 hotbeds of *Diphyllobothrium latum* were determined: strong natural and weak synanthrope.

As per study, it was found out that getting infected with *Diphyllobothrium latum*, one of the principal helminthiosis infectors of the domestic cats, acccounted (Greater Caucasus) for 8.3% in Mingachevir and 3.2% in Jeyranbatan. The parasitic hotbed of diphylobotriosis was first recorded in these regions.

The strong natural and strong synanthrope hotbeds of *Dipylidium caninum* species are known. *Dipylidium caninum* was noted in 40.4% -53.4% of all 4 studied regions in the domestic carnivores.

The parasitic centers of diphidiosis have been recorded with the foregoing figures in the territories of these regions.

The strong natural and strong synanthrope hotbeds of *Taenia hydatigena* are known. These species included 39.7% in the Greater Caucasus region of the domestic carnivores, 38.3% in the Lesser Caucasus, 33.7% in the Kura basin, and 35.3% in the Lankaran natural region.

The strong natural and weak synanthropic hotbeds of *Multiceps multiceps* have been determined.

M. multiceps was noted extensively 23.7% in the Greater Caucasus region, 9.3% in the Lesser Caucasus, 12.9% in the Kura foothills, and 18.4% in the Lankaran natural region in the domestic carnivores.

The strong natural and weak synanthrope hotbeds of *Alveococcus multilocularis* species are known. The infection of the domestic carnivores with this species was noted extensively 24.3% in the Greater Caucasus region, 27.8% in the Lesser Caucasus, 13.2% in the Kura basin, and 11.4% in the Lankaran natural region.

Two strong natural and weak synanthrope hotbeds of *Echinococcus granulosus* species have been determined. The infection of the domestic carnivores with *E. granulosus* species was noted between 22.3% and 37.8% in the studied regions.

The strong natural and weak synanthrope hotbeds of *Trichinella spiralis* are known. *T. spiralis* was noted with low extensiveness in the domestic carnivores in all regions - 19.7% in the Greater Caucasus region, 5.2% in the Lesser Caucasus, 6.4% in the Kura basin, and 8.3% in the Lankaran natural region.

The weak natural and synanthrope hotbeds of *Dirofilaria repens* have been determined. *D. repens* was noted extensively 23.2% in the Greater Caucasus, 18.7% in the Lesser Caucasus, 27.1% in the Kura basin, and 25.3% in the Lankaran natural region in the domestic carnivores.

The strong natural and synanthrope hotbeds of the geohelminths (*Ancylostoma caninum, Uncinaria stenocephala, Toxascaris leonina, Toxocara canis, T. mystax*) were determined in all the studied regions.

The infection of the domestic carnivores with *Ancylostoma caninum* has included a high extensiveness in the Greater Caucasus - 53.1%, the Lesser Caucasus - 49.7%, the Kura Basin - 41.2%, Lankaran - 43.4%.

The infection of the domestic carnivores with *U. stenocephala* whas included a high extensiveness in the Greater Caucasus - 53.4%, in the Lesser Caucasus - 48.3%, in the Kura Depression - 42.5%, in the Lankaran natural region - 39.7%.

The infection of the domestic carnivores with the species *Toxascaris leonina* has included 51.2% in the Greater Caucasus, 50.1% in the Lesser Caucasus, 41.2% in the Kura basin and 35.1% in the Lankaran natural region.

The infection of the domestic carnivores with the species *Toxocara canis* has included 38.1% in the Greater Caucasus, 19.4% in the Lesser Caucasus, 23.7% in the Kura foothills, and 21.3% in the Lankaran natural region.

The infection of the domestic carnivores with the species *Toxocara mystax* has included 12.1% in the Greater Caucasus, 15.7% in the Lesser Caucasus, 14.6% in the Kura basin and 21.7% in the Lankaran natural region.

We have prepared a GIS map of the parasitic hotbeds created by the main helminths.

The map includes the extensive prevalence of the principal helminthiosis infectors across all the regions, altitude above sea level and geographical location. The map of the parasitic hotbed of the principal helminthiosis infectors in the territory of study was made in a digital database using geographical spatial analysis through Arg GIS (Geographical Information System) program. The parasitic hotbeds found after studies in various areas of Azerbaijan were placed on a map in accordance with geographical coordinates through special algorithmic diagrams, and there were outlined the range of the infectors. The diagram features of the parasitic hotbeds created by principal helminthiosis infectors. The diagrams made on the basis of study outcomes include one or more parasitic hotbeds. The map has been made on a scale of 1:500000.

The principal helminthiosis infectors have spread in high extensivity in some areas whereas they are few in some. Some helminthiasis infectors created single hotbed whereas some made mixed ones on a local scale. Using map and study outcomes, parasitic hotbeds of the principal helminthiosis infectors have been districted. GIS mapping was considered expedient as it keeps up with the present day [11].

Let's take the looking at the prevalance of the principal helminthiosis infectors found in the domestic carnivores, and the parasitic hotbeds they create in the different areas.

The pie diagram shows the distribution of several helminths in the area. The names of the helminths are shown in the same color frame on the right.

The anthropogenic factors have a significant impact on the formation of the mixed parasitic hotbeds. So as a result of this effect, first of all, the lifestyle of the animals changes. The effects of the anthropogenic factors in the territory of the Republic (deforestation, laying of new oil, gas and water pipes, the expansion of the individual planting-soil fields) have caused the narrowing of the natural feeding areas of the wildlife. The planting of greenery in the sub rural and suburban areas, the establishments of poultry and other farms in the surrounding area have provided the

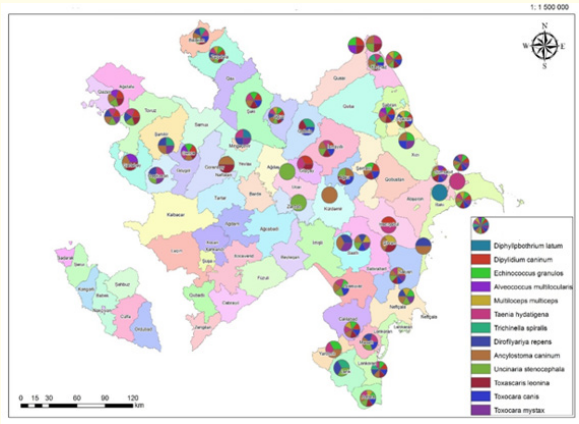

Figure 1: GIS mapping of the parasitic hotbeds of the helminth infectors in the territory of Azerbaijan.

condition wild animals looking for food to get into the dwellings. These factors have led to regularly moving of the wild animals from natural feeding areas to the sinantropic hotbed - dwellings to get a food. As such cases last a long period of time, the mixed hotbed has formed between the natural and sinantropic hotbeds. On the other hand, the prohibition of hunting of the wild animals and the stooping of the leather supply in order to protect the biodiversity of the animals have led to a significant increase in the number of the wild animals. This has resulted in increased wildlife density in nature and lack of food among animals. The mixed parasitic hotbed is infested with helminths that are specific to both wild and domestic carnivores. This mixed hotbed is always polluted with helminth eggs, where the mutual invasion occurs between wild and domestic carnivores. This means that in the mixed hotbed the domestic carnivores are infected with helminths that are inherent in the wild carnivores and in turn the wild carnivores are infected with helminths belonging to domestic carnivores. The infected animals also spread the eggs of the infected dangerous helminths in sinantropic hotbed and infect human and domestic ruminating animals by seriously damaging them from the medical, veterinary and sanitary point of view. The transmission of the pathogenic helminths from natural hotbeds to sinantropic and vice versa leads to the formation of the helminth fauna in both hotbeds.

The infected stray dogs and cats also infect humans and domestic ruminants in a synanthropic hotbeds with the dangerous helminths which they infect from mixed hotbeds.

Results

As a result of long-term parasitological studies, it was found out that, the domestic carnivores, their intermediary hosts and anthropogeneous factors have a considerable effect on creation and spread of the natural, synanthropicand mixed parasitic hotbeds of hazardous helminthes in the regions.

Conclusion

It is practically important to learn every single factor that ensures the creation of the parasitic hotbeds in the regions and make its GIS map.

It is important to avoid the violation of the circulation ways of the principal helminthiosis infectors in the parasitic natural, synanthropic and mixed hotbeds formed in Azerbaijan, and the formation and spread of new parasitic hotbeds.

By determining these factors and using GIS map, it is possible to take preventive measures for avoidance of the parasitic hotbed creation in the territories.

The preparation of a GIS map of the main pathogenic helminths has important practical significance. So the compiled GIS map is not permanent (always under control), it is possible to predict the appearance and spread of the parasitic hotbeds in near and other territories in the future, as well as to take preventive measures against them. At the same time, the current GIS map can be considered as a starting material for the determining of its causes compared with the new created parasitic hotbeds in different areas.

It is important to avoid the violation of the circulation ways of the principal helminthiosis infectors in the parasitic natural, synanthropic and mixed hotbeds formed in Azerbaijan, and the formation and spread of the new parasitic hotbeds.

It is practically important to learn every single factor that ensures the creation of parasitic hotbeds in the regions and make its GIS map. By determining these factors and using GIS map, it is possible to take preventive measures for avoidance of parasitic hotbed creation in the territories. So the compiled GIS map is not permanent (always under control), it is possible to predict the appearance and spread of the parasitic hotbeds in near and other territories in the future, as well as to take preventive measures against them. At the same time, the current GIS map can be considered as a starting material for the determining of its causes compared with the new created parasitic hotbeds in different areas.

So the domestic carnivores, their intermediate hosts, partly the role of the wild animals and anthropogenic factors influence significantly to the formation and spread of the natural, synanthropic and mixed parasitic hotbeds of the main helminthic pathogens in the areas.

Bibliography

1. Sadigov IA. "On hotbeds of the principal helminthioses of the human and domestic animals". News of the Azerbaijan National Academy of Sciences, series of the nature sciences 1 (1999): 38-42.

2. Asadov SM and Ismailov GD. "The role of the dogs in the cycle of the natural-hotbed helminths in Azerbaijan". *Reports of AN SSSR* 2 (1972): 70-72.

3. Fataliyev GH and Ibrahimova RSh. "The natural and synanthrope hotbeds of the helminthiosis infectors of the wild and omnivorous animals". News of the Azerbaijan National Academy of Sciences 66.3 (2011): 132-136.

4. Boev SN. "The natural hotbeds of the helminthiosis". News of the Kazakhystan National Academy of Sciences 6 (1970): 46-49.

5. Vagin Nf and Malisheva NS. "*Trichinella spiralis* in the natural and synanthrope hotbeds of Kursk province". *Russian Parasitological Journal* 2 (2010); 33-36.

6. Galuzo IG., *et al*. "The problem of the natural hotbeds of the diseases". Alma-Ata (1968): 6-14.

7. Romashov V. "The natural hotbed helminthioses in the Natural Chernozemye (Province of Boronedz)". Materials of Russian congress of society of parasitology Saint-Petersburg (2008): 96-100.

8. Uspenskiy AV. "The formation and functioning of the natural hotbeds of *Trichinella spiralis*". *Russian Journal on Parasitology* 1 (2007): 41-45.

9. Sheykina EE and Sergiev VP. "The features of the formation of the synanthrope hotbeds of the dirophiliariosis in Russia". *The Medical Parasitology and Parasitic Diseases* 4 (2009): 9-11.

10. Ibrahimova RSH. "The bioecological features of the spread of the principal helminthiosis infectors of the domestic carnivores". News of the Nakhchivan department of Azerbaijan National Academy of Sciences, series of the nature and technical sciences, Nakhchivan "Tusi" 14.4 (2018): 222-227.

11. Mehdiyev Ash and Ismayilov AI. "Geographycal information systems". Baku (2011): 232.