Preliminary epidemiological study of some zoonoses in dogs and their impact on human health in the Istrian Country, Croatia

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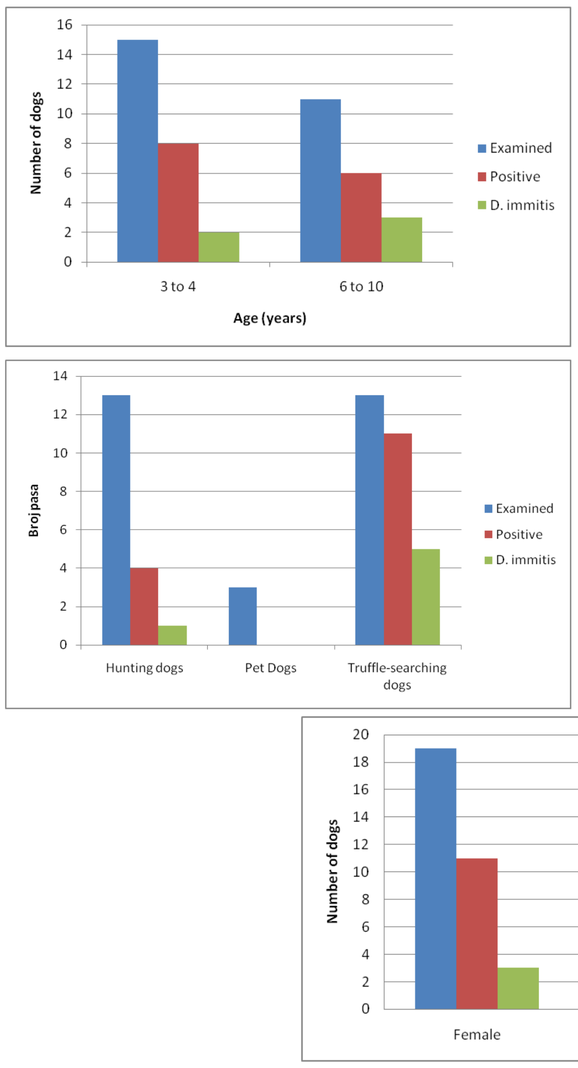
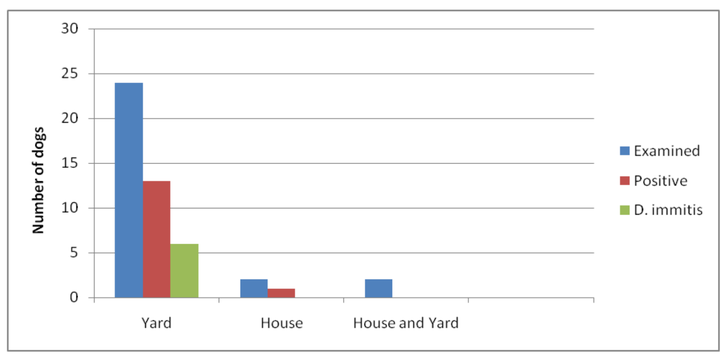
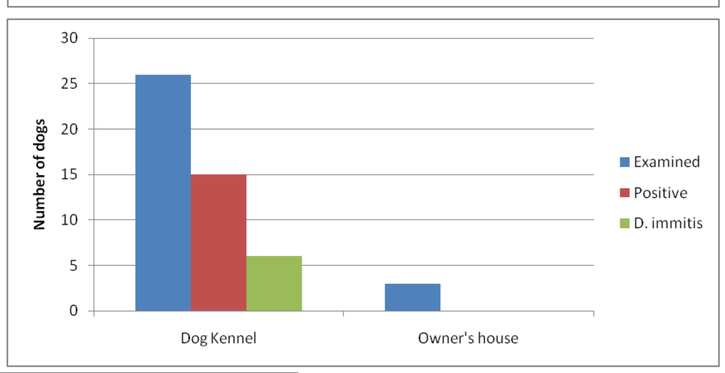
INTRODUCTION: Zoonoses are diseases that are transmitted directly or indirectly from animals to humans. Today more than 200 zoonoses are known with different clinical signs that require different epidemiological approaches to surveillance and control. The use of epidemiological methods for detection and control of zoonoses, especially in animals living close to humans such as dogs, is an important factor in public health. Some zoonoses in dogs such echinococcosis, rabies, etc., are controlled in accordance with the legislation (laws, regulations) but there are zoonoses in dogs which are not regularly controlled and there is no accurate data about their prevalence. Therefore, they remain as unknown risk factors for the owners and other people with whom dogs come in contact. Some of these zoonoses are granulocytic anaplasmosis, erlichiosis, borreliosis and dirofilariosis caused by *Anaplasma phagocytophilum*, *Ehrlichia canis*, *Borrelia burgdorferi* and *Dirofilaria immitis,* respectively.

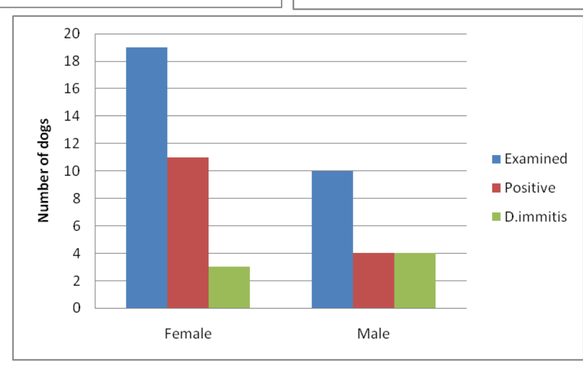
The aim of the study is to determine the seroprevalence of: *Borrelia burgdorferi, Anaplasma phagocytophilum, Ehrlichia canis / Ehrlichia ewingii* and *Dirofilaria immitis* in healthy dog population in the Istrian County and to evaluate age, breed as well as keeping (indoors or outdoors) and use (pets or watchdogs or hunting dogs and truffle dogs) of dogs as risk factors.

METHODS: The samples were taken from 134 clinically healthy dogs in the Istrian Country during 2015. The aim was to detect *Dirofilaria immitis* antigen, *Borrelia burgdorferi* antibody, *Anaplasma phagocytophilum* antibody and *Ehrlichia canis/Ehrlichia ewingii* antibody with SNAP® 4Dx® Plus Test. A modified Knott test was used to detect microfilaria in the blood sample. An epidemiological study of potential risk factors was conducted throughout an epidemiological questionnaire that was used for an assessment of risk factors. The third part of the epidemiological questionnaire contained questions related to specific data such as breed, age and sex, and data which were describing the way of keeping dogs, housing, moving, feeding, communication with other dogs, and the role of dogs in household in general (pet, hunting dog, dog truffle). EpiInfo, WinEpiscope ver. 2, and Statistics 10 were used to calculate the risk as the prevalence ratio (PR) and the odds ratio (OR). Statistical significances among groups have been tested using Proportion Testing, Chi Square Test and Regression Analysis The significance difference was checked at the level of 95% (P <0.05).









Risk factor	Prevalence ratio	CI 95%	Odds ratio	CI 95%
Breed big/medium	1,50	0,43-5,2	2	0,27-14,7
Age old/young	1,02	0,49-2,07	1,05	0,22-5,16
Sex male/female	1,44	0,61-3,38	2,06	0,43-9,80
Hold house/yard	1,08	0,25-4,54	1,18	0,06-21,17
Purpose truffle-searching dogs/hunting dogs	2,75*	1,78-6,41	12,37*	1,82-83,77
Motion yard and house during the night and day/ yard and house during the day	0,78	0,32-1,88	0,54	0,04-6,76

Risk factor	Prevalence ratio	CI 95%	Odds ratio	CI 95%
Breed big/medium	0,43	0,03-5,77	0,38	0,02-7,40
Age old/young	2,05	0,41-10,25	2,44	0,33-17,91
Sex male/female	1,9	0,47-7,75	2,29	0,37-14,35
Purpose truffle-searching dogs/hunting dogs	5,00	0,67-37,12	7,5	0,73-76,77
Motion yard and house during the night and day/ yard and house during the day	4,17*	1,02-17,08	10,5	1,03-107,08

RESULTS: Out of 134 examined healthy dogs, *Dirofilaria immit* and *Anaplasma phagocytophilum* were found in 16 (11.94 %, CI 95 % 6.45-17.43 %) and 5 (3.73 %; CI 95 % 0.52-6.94 %) dogs, respectively. Out of 29 examined dogs tested both by SNAP* 4Dx* Plus and modified Knott test, dirofiralia was found in 15 (51.72 %; CI 95 % 33. 82- 70.19 %) dogs using modified Knott test and in 6 (20.69 %,; CI 95 % 6.18 % do 35.72 %) dogs using SNAP* 4Dx* Plus test, which implies that *D. immitis* has been present in 40% of the modified Knott test positive dogs. With the aim of assessing age, breed, keeping and use of dogs as risk factors, significant differences have been found. The most infected breeds were Labrador retrivers and English setters. Dogs kept outdoors were two times more infected in comparison to those kept as indoor pets. The most significant differences were found between truffle dogs and other hunting dogs (OR = 12.37, P = 0.0046).

CONCLUSION:
This preliminary study has shown the potential risk of exposure to *Anaplasma phagocytophilum* and *Dirofilaria immitis* in the Istrian County. Therefore, it is of great importance the role of the veterinarians in public health, in education and implementation of other preventive measures in order to raise awareness among owners as well as hunters about the presence and control of these diseases both in dogs and people.