TOXOPLASMOSIS IN NORTH-EAST ROMANIA. DESCRIPTIVE STUDY COUNTING CASES BETWEEN 2010 AND 2016

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TOXOPLASMOSIS IN NORTHEAST ROMANIA. DESCRIPTIVE STUDY COUNTING CASES BETWEEN 2010 AND 2016 (Abstract): Infection with the parasite protozoa *Toxoplasma gondii* has a worldwide distribution. The mandatory intracellular parasite can infect humans, practically all warm-blooded animals, including mammals and birds. The study aim was to highlight descriptive epidemiology data on toxoplasmosis in patients admitted to a regional infectious disease hospital in North East Romania. **Material and methods**. We conducted a descriptive longitudinal study on a group of 160 patients admitted to the Iasi Clinical Hospital of Infectious Diseases with the diagnosis of toxoplasmosis, during 2010 and 2016. **Results**. Annual distribution of patients with toxoplasmosis had a maximum of frequency in 2010 (34 cases – 21.25%) and a minimum in 2016 (6 cases – 3.75%), with an increasing trend for the whole interval of study. Most of the patients were females (111 cases – 69.37%; M/F ratio = 0.44), from urban area (59.0%; U/R ratio = 1.43). The most affected age group was that of 15-24 years (38 cases – 23.75%), followed by 25-34 years (36 cases – 22.50%). Children aged between 1-4 years were less affected (3 cases – 1.87%). Either infants aged 0-1 year, or elderly persons over 74 did not admitted with toxoplasmosis. **Conclusions**. The frequency and severity of the disease are used to assess its medical relevance, and data on this can be collected in specific studies or surveillance systems. Targets for the future could be the implementation of a surveillance system of toxoplasmosis of any kind (acquired or congenital), a vaccine and, over time, a zero-incidence level of the disease.
Keywords: TOXOPLASMOSIS, EPIDEMIOLOGY, WATERBORNE DISEASE, MARINE, WILD FELID.

The world, whatever it is, the land, the navy or the wings, is full of toxoplasmosis. Infection with the parasite protozoa *Toxoplasma gondii* has a worldwide distribution. The mandatory intracellular parasite can infect humans, practically all warm-blooded animals, including mammals and birds. The first description was made by Nicolle and Manceaux in 1908 in rodent populations in North Africa, but its entire lifecycle was only definitively understood in the late 1960's, with the discovery of the cat's central role as

the definitive host for the sexually parasitic cycle and the spread of oocysts through faeces. His medical significance remained unknown until 1939, when *T. gondii* was identified in the tissues of a congenital infected child, and the veterinary importance became known in 1957 when it was found to have caused abortion in sheep. The discovery of the Sabin-Feldman test in 1948 led to the recognition that *T. gondii* is a common parasite of the warm-blooded host with a worldwide distribution. The real significance of the clinical implications of toxoplasmosis in humans was unknown until the first reports of cases of congenital toxoplasmosis, subsequently the role of *T. gondii* infection in immunocompromised patients was recognized in the mid-1970's and the concept of reactivation of the infection was subsequently investigated. In the last decade, the development of new genotyping tools has led to discoveries in understanding the global evolution of *T. gondii* phylogenetics and the recent advances in studies related to the degree of virulence of the protozoan associated with some genotypes (1, 2, 3, 4, 5).

Approximately 25-30% of the world's human population is infected with *Toxoplasma*. In fact, prevalence varies greatly between countries (from 10 to 80%) and often in a particular country or between different communities in the same region. The decrease in seroprevalence (10-30%) was observed in North America, Southeast Asia, North Europe, and the Sahel region of Africa. Moderate prevalence (30-50%) was found in Central and South European countries, and in Latin America and African tropical countries there were high prevalence rates (1, 2).

Screening of the large diversity of *Toxoplasma* host species has no specific test. The sensitivity and specificity of the techniques depend on animal species and the cutoff values are difficult to establish because the reference sera in experimentally infected animals are missing. Even when these sera are available for a species, they do not reflect natural conditions because experimental animals are often infected with high doses and sometimes by unnatural pathways that can cause excessive antibody titers. The modified agglutination test (MAT) seems to be most appropriate for a large number of species, but specific tests for enzyme immunoabsorption (ELISA) have been developed for certain species of domestic animals (1, 2, 3).

The incidence of toxoplasmosis in the general population in Romania and the incidence of congenital malformations were decreased according to the data reported to the Center for Calculation and Sanitary Statistics during 2000 and 2011. The mean incidence was 1.45‰ with the highest value (1.97‰) in 2003 and the lowest (1.15‰) in 2000. The highest average incidence was in the environment urban (1.96‰) and the age group under 1 year (2.24‰) (7).

In Romania, toxoplasmosis is a disease with mandatory reporting. Cases of *T. gondii* have been reported since 2007 as a "single case report of the communicable disease case" within 5 days of the detection of the suspect or confirmed case (8).

The study aim was to highlight descriptive epidemiology data on toxoplasmosis in patients admitted to a regional infectious disease hospital in North-East Romania.

MATERIAL AND METODS

We conducted a descriptive longitudinal study on a group of 160 patients admitted to the Iasi Clinical Hospital of Infectious Diseases with the diagnosis of toxoplasmosis, during 2010 and 2016. The data were collected from patient records and reported

files, respecting the confidentiality of the information. Inclusion criteria were limited to diagnosis of toxoplasmosis, and exclusion criteria did not refer to gender, residence area, or any age group. Secondary diagnoses and co-morbidities did not take into consideration, also.

The data was processed with the MS Excel 2010 software.

RESULTS

Annual distribution of patients with toxoplasmosis had a maximum of frequency in 2010 (34 cases – 21.25%) and a minimum in 2016 (6 cases – 3.75%), with an increasing trend for the whole interval of study (fig. 1).

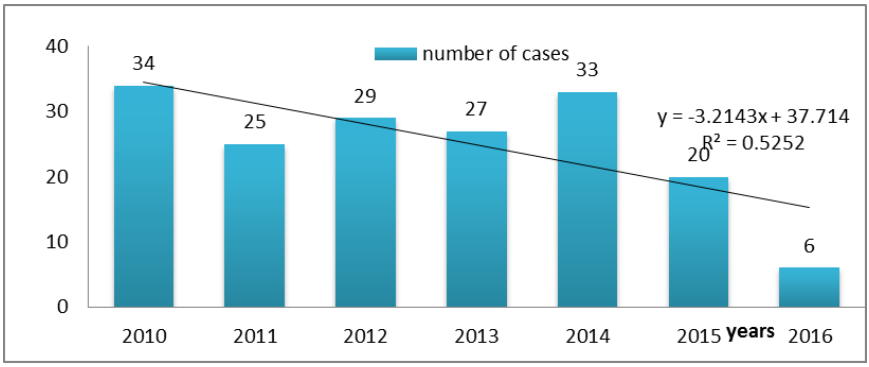
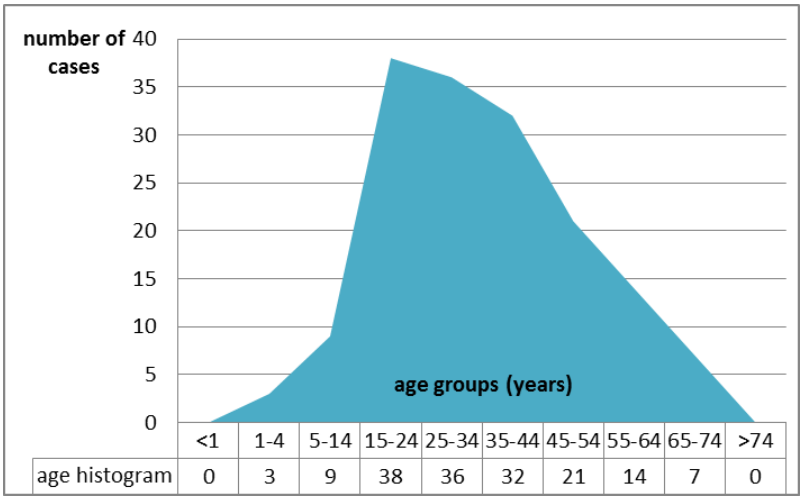


Fig. 1. Distribution of cases with toxoplasmosis by year of study

Most of the patients were females (111 cases - 69.37%; M/F ratio = 0.44), from urban area (59,0% ; U/R ratio = 1.43). The most affected age group was that of 15-24 years (38 cases – 23.75%), followed by 25-34 years (36 cases – 22.50%). Children aged between 1-4 years were less affected (3 cases – 1.87%). Either infants aged 0-1 year, or elderly persons over 74 did not admitted with toxoplasmosis (fig. 2).



	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	>74
age histogram	0	3	9	38	36	32	21	14	7	0

Fig. 2. Age histogram of patients with toxoplasmosis

Most of patients had a diagnosis of toxoplasmosis without any specification of site or organ involvement (149 cases – 93.12%, M/F = 0.43). There are several cases suffered from toxoplasmosis with ocular involvement (2 cases, both males – 1.25%), as well as other organs (9 cases – M/F = 2/7) (fig. 3).

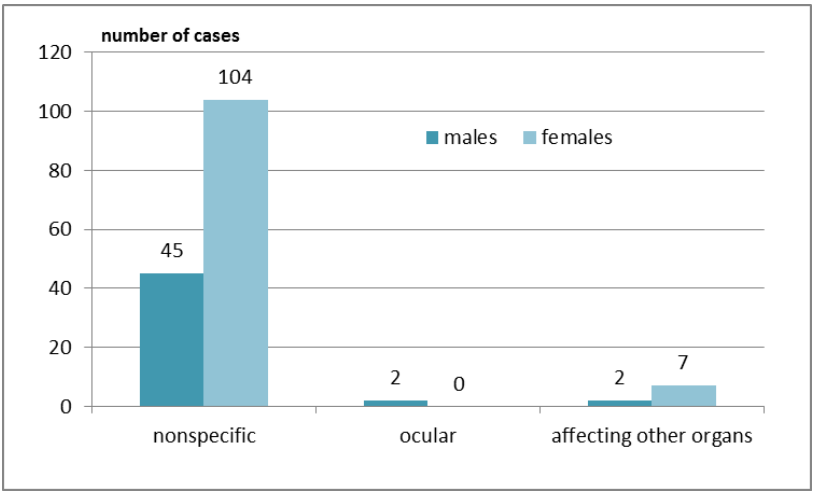


Fig. 3. Toxoplasmosis cases related to gender and specific sites

Distribution by month of admission showed a cluster of cases diagnosed during April - May and another one during September, with a maximum in May (21 cases – 13.12%) and a minimum in December (5 cases – 3.12%) (fig. 4).

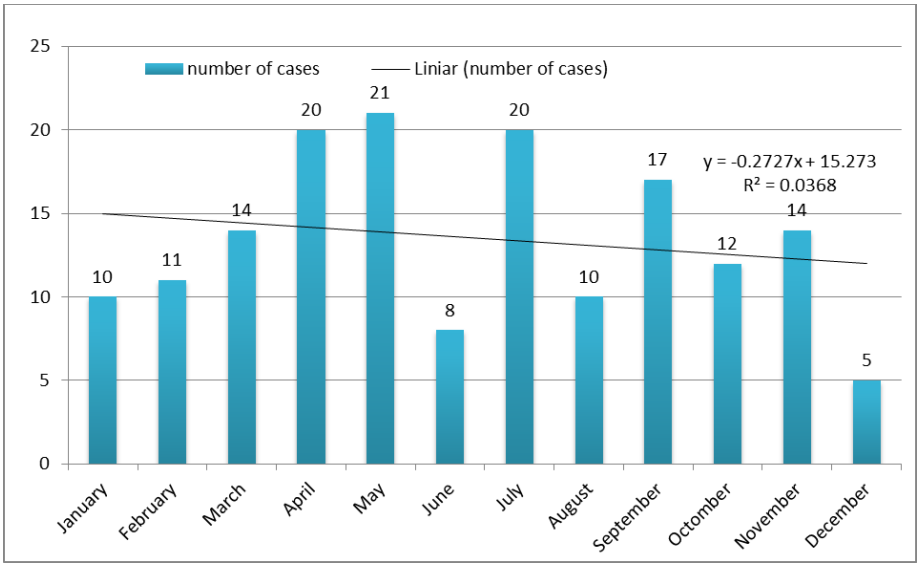


Fig. 4. Distribution of cases by month of admission

Seasonal distribution highlighted a predominance of cases admission during Spring (55 cases – 34.37%), then in Autumn (43 cases – 26.87%), Summer (38 cases – 23.75%), and Winter (26 cases – 15.01%) (fig. 5).

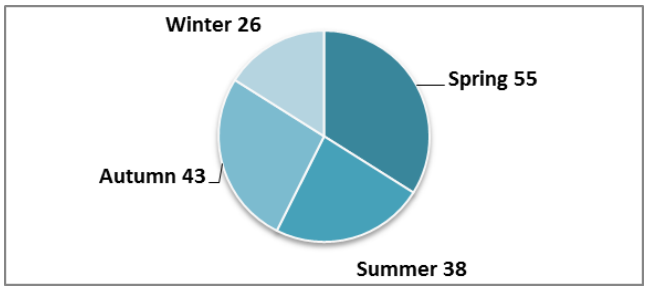


Fig. 5. Seasonal distribution of cases

As compared with hospitalization days due to all diagnoses were of 540,721 for all 72064 cases admitted with infectious diseases, during 2010 and 2016, hospitalization days for 160 patients with toxoplasmosis were 939, from which nonspecific – 895 days, ocular – 8 days, and toxoplasmosis affecting other sites – 36 days (tab. I)..

TABLE I.
Average length of stay

Diagnosis	Number of cases	Hospitalization days
All	72064	540721
Toxoplasmosis - nonspecific	149	895
Toxoplasmosis - ocular	2	8
Toxoplasmosis - other organs	9	36

DISCUSSION

Toxoplasmosis has been identified in mammals and birds which more than 350 host species, mammals and birds, most of them in the wild.

Peridomestic felid species habiting near farms or wild species can contaminate the environment by eliminating oocysts. Intermediate wildlife will subsequently become contaminated when the felids are present in the environment. Of the 39 feline species in the world, serological and parasitologic studies have shown that 31 species have *T. gondii* infection. In wild felids, the seroprevalence is high and can reach 100%. The processes leading to the infestation of wildlife populations are complex, involving physical, biological, ecological, and zoological factors and characteristics. The dry and warm climate is considered to be unfavorable to the survival of the oocysts. Countries with such climate report lower values of the prevalence of toxoplasmosis in wild animals, but countries in wet tropical regions report increased levels of toxoplasmosis prevalence. The susceptibility of the host species to *T. gondii* infection is a condition for the occurrence of diseases. Studies have shown that some species are resistant or heal spontaneously. Other studies have highlighted that the lifespan of animal species (dependent on their size and weight) influences the risk of infestation and explains the low incidence rates (1-5%) of toxoplasmosis in small rodents (9, 10).

Food behavior is another risk factor, the prevalence of infection being often lower

in ruminants than in omnivores and carnivores, due to the cumulative efficacy of the predator cycle of the parasite. Among the wild mammals in the Amazon forest (French Guyana), terrestrial mammals were significantly more exposed to *T. gondii* than arboreal mammals, due to ground-based behavior in carnivores. In the northern hemisphere, a high prevalence was found in carnivores (black bears and red foxes) or in omnivorous species such as wild boars that are exposed to infections by ingestion of both oocysts and tissue cysts. An ecological approach to studying the parasite movement in wildlife includes factors such as bird migration, fragmentation of the landscape (through rivers, roads, cultivated areas, localities, etc.), oocyst dispersion, or predatory behavior of different species of felids in various wild environments. Marine mammals such as sea otters, dolphins, seals and mollusks have recently been studied, with prevalence ranging between 47 and 100%. These marine mammals serve as sentinels for environmental contamination by oocytes through the drainage of freshwater into the marine ecosystem (1, 12, 13).

There are many risk factors which can influence the seroprevalence values of toxoplasmosis in humans. Higher prevalence values were observed for tropical countries with wet and warm climates and the lowest in countries with arid or cooler climate. Anthropogenic factors explain much of the variation in human seroprevalence, including eating habits, hand washing, eating meat and cooking, cleaning vegetables, etc. Other economic, social or cultural factors, water quality and sanitation are worthy of consideration. Seroprevalence increases with age, but age-related infection rates vary by country and socio-economic level. The assessment of maximum seroprevalence can be achieved in childhood in populations living in poor hygienic conditions, probably related to contamination of water, food, or by the ingestion of oocysts (1, 14).

Contaminated water is an important way of transmitting infection to humans in areas where non-filtered surface water is used for consumption and probably also in areas where fresh water is in contact, for example for recreation. For example, in a city located in the northern state of Rio de Janeiro (Brazil), adjusted age-adjusted seroprevalence was 84% for the lower socio-economic group compared to 62% for seroprevalence and 23% for higher socio-economic groups. Most people (up to 84%) of the lower socio-economic population were infected by the age of 15, while the infection was mainly obtained after the age of 20 in the higher socio-economic population (from about 20% for 20-29 age groups to 70% for the 40-49 age groups). In a multivariate analysis of the risk factors, this was attributed to water supply differences, with the poorest populations living in areas with unfiltered water. These different models of *Toxoplasma* infection depending on socio-economic levels may be more relevant in under-developed tropical countries, but in the United States, toxoplasmosis has also been considered a poverty-related infection. Increased socio-economic levels, along with improved hygiene conditions, changes in farm systems, frozen meat consumption, and sterilized food cats have led to a steady decline in seroprevalence in most industrialized countries over the last decades. In the United States, a national study found a decrease in age-adjusted *T. gondii* prevalence in 12-49 age groups, from 14.1% in 1988 - 1994 to

9% in 1999 – 2004. In France, seroprevalence in pregnant women was approximately 80% in the early 1960's, around 66% in the 1980's, 54% in 1995 and 44% in 2003, while the average age of pregnant women increased. This decrease in seroprevalence was observed in all areas where it was studied in Europe. For example, in the Netherlands, seroprevalence decreased from 35.2% in 1995 - 1996 to 18.5% in 2006 - 2007 in women at reproductive age (1, 2, 5, 15, 16, 17).

CONCLUSIONS

Our study highlighted that it is important to correctly report cases of toxoplasmosis in the general population, as well as to pregnant women, fetuses, neonates and children as this contributes to the motivation of the different screening programs currently performed worldwide. The frequency and severity of the disease are used to assess its medical relevance, and data on this can be collected in specific studies or surveillance systems. Targets for the future could be the implementation of a surveillance system of toxoplasmosis of any kind (acquired or congenital), a vaccine and, over time, a zero-incidence level of the disease.

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NEWS

TREATMENT OF ERYTHEMATO-TELANGIECTATIC ROSACEA WITH BRIMONIDINE

In a study by Micali et al, the outcome of a group of patients with erythematotelangiectatic rosacea treated with brimonidine alone or combined with a vascular laser was evaluated. The patients were affected by persistent erythema and varying degrees of telangiectasias. The patients were evaluated using erythema-directed digital photography by VISIA-CR™ system and X10 dermoscopy. A single application of brimonidine 0.33% gel was used for patients showing marked background erythema and minimal telangiectasias. A session of Nd: YAG laser was used for patients in the second group showing marked erythema and telangiectasias, followed by a reevaluation 1 month later after a single application of brimonidine. At the end of the therapy, an Investigator Global Assessment of outcome was done. A marked reduction of the background erythema was observed in all patients 6 h following the application of brimonidine. In the second group, there was a marked reduction of the erythema in all cases 6 h after brimonidine application, but not of telangiectasias. Complete clearing of facial erythema was observed following the treatment with brimonidine 1 month after the Nd: YAG laser session. The results of the study showed that the preliminary evaluation of the vascular component by erythema-directed digital photography and dermoscopy is helpful for selection of the appropriate treatment in erythematotelangiectatic rosacea (Micali G, Dall'Oglio F, Verzì AE, Luppino I, Bhatt K, Lacarrubba F. Treatment of erythematotelangiectatic rosacea with brimonidine alone or combined with vascular laser based on preliminary instrumental evaluation of the vascular component. *Lasers Med Sci* 2017 Sep 9. doi: 10.1007/s10103-017-2318-3).

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