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Epidemiological Situation of Toxocariasis in Iran: Meta-analysis and Systematic Review

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Abstract: Toxocariasis is the clinical terms applied to infection of human with ascarid nematodes in the order Ascaridida, named *toxocara canis* and *toxocara cati*. It is transmitted from dog and cat to humans. Accidental ingestion of parasite eggs causes ocular and visceral larva migrans in human. The aim of this study is to study epidemiology of toxocariasis in Iran using meta-analysis and systematic review. Using main key words of toxocariasis including epidemiology, Toxocara spp. Iran, dog and cat in databases such as SID, Google scholar, Pubmed, Magiran and Iranmedex, a number of 50 articles was extracted. A number of 27 articles of them were eligible for meta-analysis. Data extracted from articles and archived in excel software for analysis. Variance of each study obtained using binomial distribution. Heterogeny of studies surveyed using Cochrans Q test. Data analyzed using Random Effect Model test. Overall prevalence of toxocariasis obtained 21.6% in Iran. In total of 27 articles, 6911 samples including 1543 carnivores, (13 articles), 4569 human sera (10 articles) and 799 soil samples (4 articles) has been investigated. Seropositivity for human toxocariasis 15.8% (95%CI, 9.2-22.5), soil contamination for *Txocara* spp. eggs 21.6% (95%CI,-1.6-44.8) and dogs and cats infections with adult worm 26.8% (95%CI, 18.7-36.8) was obtained. Results of this study show that prevalence of toxocariasis has a growing trend in Iran. It could be decreased using education, culture making and giving information to people.

Key words: Txocariasis, seroprevalence, epidemiology, ascarid nematodes, parasitic animals

INTRODUCTION

A large number of people are infected with diseases that are common between humans and animals. The role of parasitic diseases is very important among infectious diseases. One of the most important zoonotic parasitic diseases is toxocariasis. It has a global spread and caused by nematode worms named *Toxocara canis* and *Toxocara cati*, intestinal worms of dog and cat, respectively. Dogs and cats are the most important factors in establishment of infection cycle. Each worm can spread two hundred thousand eggs into human environment every day. Toxocariasis caused by ingestion of parasite eggs via contaminated soil, food, water and contacting dog and cat. Several studies have shown that children often become infected. It leads to a range of clinical signs and organ involvement. Clinical signs of the disease are nonspecific and include neurological, eye, lung, skin and sometimes rheumatic.

The global distribution of toxocariasis has shown in different countries using sero-epidemiological surveys. The seroprevalence rate has been reported 4.6% in America, 2.5% in Germany, 19% in Netherland and 10.9% in Jordan (Tavassoli *et al*., 2008). Also different statistics have been reported about seroprevalence of toxocariasis in Iran. Sadjadi and colleagues have reported that 25.6% of children between 6-13 years old have antibody against *Toxocara* spp. (Sadjjadi *et al*., 2000). Seroprevalence of toxocariasis has also been reported 5.3 and 4.48% by Fallah *et al*. (2005) and Akhlaghi *et al*. (2006), respectively. Arbabi and colleagues have reported that 19.2% of stray dogs and 46% of herd dogs are infected with *Toxocara canis,* in Tehran (Mohsen and Hossein, 2009). Review articles are a great bunch of medical articles that have a special place among researchers because of their importance, integrity and credibility. The aim of writing these articles is a response to question or solve a problem. Searching articles and combining their results lead answering questions or finding a solution to the problem. So given that the overall prevalence of the disease is unknown and since dogs and cats are potential source of *T. canis* and *T. cati* infections in man and a systematic study has not taken place on articles published about toxocariasis in Iran, it was therefore decided to conducted a study on the prevalence and intensity of these parasites.

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MATERIALS AND METHODS

This study is a systematic review and meta-analysis including papers and data collecting, data analysis and data interpretation. Toxocariasis, Iran, intestinal worms, dog and cat were used as keywords for searching. Google scholar, Sid, Magiran, Pubmed and Iranmedex, were used as resource databases. A total of 50 articles were found and after surveying articles, 27 of eligible articles were selected. Selected data archived in excel software for analysis. Name of magazine and author recorded for each article. Variance of each study obtained using binomial distribution. Heterogeny of studies surveyed using Cochrans Q test. Data analyzed using Stata software and Random Effect Model.

RESULTS AND DISCUSSION

In total of 27 articles, 6911 samples including 1543 dogs and cats (13 articles), 4569 human sera (10 articles) and 799 soil samples (4 articles) have been investigated by Iranian researchers (Table 1). Figure 1 shows that prevalence rate has a growing trend in Iran, the diameter of circle is small in 2000 and is larger in 2005 to 2007, so that the prevalence of 5% from (Fallah *et al*., 2005), 9% from (Tavassoli *et al*., 2008), 13% from (Akhlaghi *et al*. 2006), 25% from Shomal in 2006 and 60% from Sari in 2007 have been reported for toxocariasis.

According to various reports, the worldwide spread of toxocariasis is very diverse. The present study is the first meta-analysis study on toxocariasis in Iran. Overall prevalence of toxocariasis in humans, animals (dog and cat) and soil was obtained, using combining data from studies conducted and published in different regions of Iran from 1995 to 2010.

Toxocariasis has a worldwide dispensation, both in developing and developed countries. For example, seroprevalence of toxocariasis in Colombia 47.5%, Sweden 7%, Spain 7% (Covde-Garcia *et al*. 1989), America 23% and Ireland 31% has been reported (Worley *et al*., 1984; Covde-Garcia *et al*., 1989). In this study seroprevalence of toxocariasis obtained 15.8% (95%CI, 9.2-22.5) in Iran that is lower than Colombia, America and Irland and is higher than Sweden and Spain. As stated in Table 1, overall prevalence of toxocariasis in Iran is 21.6% (95%CI, 16-26). Iran is a country that has various climates in different areas. Lowest seroprevalence rate of 2% has been reported in Zanjan. Perhaps low temperature (cold) of Zanjan region has led to low prevalence (Nurian and Amiri 2009).

Table 1: Overall prevalence of toxocariasis in Iran and prevalence of toxocariasis based on sources of study, 1: Study on soil, 2: Study on animal, 3: Study on human

Study		No. of sample	Prevalence %	95% Conf. Interval
Studies on soil	Shiraz 2002	112	6.0	1-10
	Urmia 2003	102	7.0	2-13
	Tabriz 2008	300	9.0	6-12
	Khoram abad 2009	285	63.0	57-68
Total	Overall 4 articles	799	21.6	-46.4
Studies on	Shiraz 1996	108	52.0	43-62
dog and cat	Tehran 1999	305	6.0	3-9
	Isfahan 1999	131	13.0	7-18
	Tehran 2001	100	23.0	14-31
	Mashhad 2002	100	37.0	27-46
	Jonub 2004	100	44.0	34-53
	Urmia 2006	206	9.0	5-13
	Gharb 2006	115	6.0	1-10
	Sari 2007	50	60.0	46-73
	Tabriz 2008	64	39.0	27-50
	Kashan 2008	113	13.0	7-19
	Esfahan 2008	96	6.0	1-11
	Tehran 2009	55	52.0	39-65
Total	Overall 13 articles	1543	26.8	18-34
Studies on	Chaharmahal 2000	250	5.0	8-2
human	Hamadan 2002	544	5.0	3-7
seroprevalence	Mahidasht 2003	260	8.0	5-11
	Ahvaz 2006	115	13.0	7-20
	Shomal 2006	1210	25.0	22-27
	Zanjan 2007	810	2.0	1-3
	Ahvaz 2008	203	25.0	19-31
	Tabriz 2009	558	29.0	25-32
	Shiraz 2000	519	25.0	21-29
	Ahvaz 2012	100	19.0	11-26
Total	Overall 10 articles	4569	15.8	9-22.5
Overall total articles	Overall 27 articles	6911	21.6	16-26

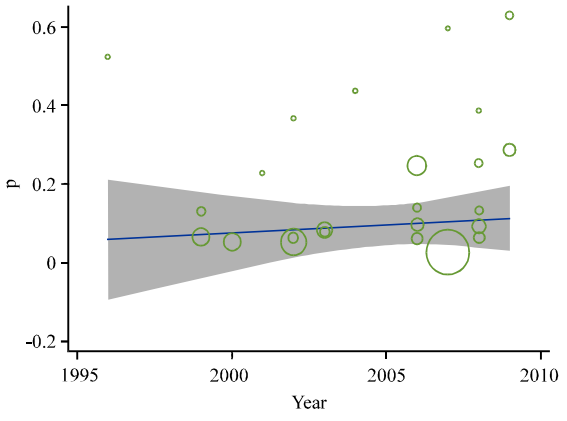

Fig. 1: Meta egresion diagram of toxocariasis and its prevalence is increasing with year, the larger diameter of circle the higher prevalence of parasites

Prevalence rate of adult *Toxocara cati* 53.3% in London and 23% in Australia have been reported (Nichol *et al*., 1981; Palmer *et al*., 2008). The infection of

dogs with *Toxocara canis* adult worm in Argentine 52% (Fontanarrosa *et al*., 2006), Spanis 71% (Martinez-Moreno *et al*., 2007) and Belgium 26% have been reported (Claerebout *et al*. 2009). Results show that mean of 26.8% (95%CI, 18.7-36.8) of dogs and cats are infected with adult worm in Iran that is lower than Argentine and Spain and is same as Belgium. The highest prevalence of adult worm (60%) in Iran has been reported from Sari in 2007. This is because of the high moisture of Sari city that located north of Iran. Contamination of public places with helminthic eggs or other parasites may vocalize a threat for public health in the city that dogs and cats defecate parks.

Previous reports have distinguished the existing of *Toxocara* eggs in soil samples of public area and gardens in London (100%), Kansas (20.6%), Hanover (30.8%), Basrah (15.5%) and Kobe (67.7%) (Dada and Lindquist 1979; Nichol *et al*., 1981; Horn *et al*., 1990; Mahdi and Ali, 1993; Zibaei and Uga, 2008). In present study overall prevalence of 21.6% obtained for soil contamination with *Toxocara* spp. Eggs. Soil contamination for *Toxocara* spp. Eggs of 60% has been reported in Khoramabad (Zibaei *et al*., 2010). This shows that the soil is the main route of transmission of parasites.

CONCLUSION

As *Toxocara canis* and *Toxocara cati* are causative agent of visceral and ocular larva migrant, public health program should be take for consideration these results and condemnation dogs and cats from public parks in rural and urban areas. Also, more consideration is necessary to improve personal and food hygiene for controlling stray dogs and cats as reservoir and training programs regarding zoonotic disease that can be transmitted to man should be developed. The finding highlights the hidden role of stray dogs for transmission of infectious disease exclusively zoonotic infections that by contamination of soil, water and food can menace people health.

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