

PREVALENCE OF GIARDIA CYSTS IN PETS, RODENTS, WITH POSSIBLE IMPLICATION IN INFANTILE DIARRHEA IN KALIOBIA GOVERNORATE

NASHOWA O. KHALIFA

Zagazig Univ., Benha Branch Fac. Vet. Med., Moshtohor Dept. Hyg. Prevent. Med. & Hygiene.

Received: 15.3.1998.

Accepted: 19.5.1998.

SUMMARY

This study was carried out in Kaliobia governorate from April to December 1997 to investigate the occurrence of Giardia cysts in dogs, cats, rodents and possible implication in infantile diarrhea.

A total of 400 faecal samples were collected from stray dogs and cats, 300 from rats and mice as well as 400 from children affected with diarrhea at age group 1-10 years. The prevalence of Giardia cysts in faecal samples amounted to, 24% dogs, 11% cats, 19.66% rats and mice; 21.48% (*Rattus rattus*), 25.55% (*Rattus norvegicus*) and 9.33% (*Mus musculus*). Giardia lamblia cysts were found in 21% in children affected with diarrhea.

Experimental infection of different species of rats and mice (*Rattus rattus*, *Rattus norvegicus* and *Mus musculus*) with Giardia cysts obtained from diseased children revealed no difference in

morphological character of infective stage and emphasized the interspecies transmission concept of Giardia and its public health importance.

INTRODUCTION

Giardia is a flagellate protozoan showing worldwide ubiquity . On the basis of the difference in shape of the median bodies there appears to be at least three species: *G. lamblia* (duodenalis, intestinalis) in man and several other mammalian species, *G.muris* in mice and *G. ranae* in frogs (Bowman and Lynn, 1995).

Giardia lamblia is the commonest enteric pathogen causing gastroenteritis in children (Melloni et al. 1993) and causes outbreaks of diarrhea in children in day care centers (Pickering et al., 1984).

There is no evidence for host specific genotype of Giardia isolated from different host species

such as sheep, calves, dog and man (Ey et al. 1996).

Therefore, the present study has been carried out to throw light on the occurrence of *Giardia* in dogs, cats, rodents and children in Kaliobia governorate and the possibility of interspecies transmission of *Giardia* between children and rodents.

MATERIALS AND METHODS

This investigation was carried out in Kaliobia Governorate during the period from April to December 1997.

Sampling:

Faecal samples were collected from 400 stray dogs and cats. 300 rats and mice were trapped alive by ordinary wire cage spring trap from different localities and transferred to laboratory where they were anaesthetized and identified according to Meehan (1984). Faecal samples were collected for microscopic examination. Moreover 400 faecal samples were collected from children at age group 1-10 years who were complaining from diarrhea and presented to the pediatric division, governmental hospitals where clinical data were collected.

Procedure:

The collected faecal samples were examined by direct wet mount method (Bowman and Lynn, 1995), flotation technique with 33% zinc sulphate (Soulsby, 1982), Formol-ether concentration technique (WHO, 1983), as well as iron hematoxylin staining method using Schaudinn's

solution fixative (Markell et al., 1992) were adopted for microscopic examination.

Experimental Infection:

Preparation and inoculation of samples were carried out according to Hewlett et al. (1982).

The inoculated samples were confirmed by observation of wet preparation of stools from infected children, the specimen was dispersed in 0.95% NaCl and filtered through four layers of gauze. The number of cysts in the resultant suspension was determined and the cysts were used within 24 hrs of collection.

Experimental infection was carried out after exclusion of infective rats and mice with *Giardia* cyst where each 7 of the same species were kept in separate cage and supplied with feed and water. Each one of the same group of the same species was infected orally with 0.2 ml of suspension of *Giardia* cysts obtained from infected children. 5 inoculated and 2 left without infection as control.

Daily examination of faecal materials of experimentally infected *Rattus rattus*, *Rattus norvegicus* and *Mus musculus* were continued until clearance of cyst excretion for a minimum of 30 days. Cysts excreted by experimentally infected rats and mice were examined morphologically and were indistinguishable from the cysts used for inoculation. Inoculated rats and mice that did not become infected were killed and their duodenal contents were examined directly for *Giardia*.

RESULTS AND DISCUSSION

Table (1) shows the prevalence of Giardia cyst in faecal samples of dogs and cats which amounted to (24%) and (11%) respectively.

The results achieved were higher than those recorded by Suobodova et al., (1995), while lies between those reported in Perth, Western Australia (Swan and Thompson, 1986) and in New Jersey, USA (Acha and Szyfres, 1992).

From the available literature dogs were implicated as an important reservoir of human giardiasis in Costa Rica (Aguilar et al., 1988), London (Sykes and Fox, 1989), Brisbane, Australia (Collyer et al. 1992), and Konya, Turkey (Guclu and Aydenizoz, 1995). In Egypt several researches detected Giardia in stray dogs, in Ismailia city (Abou-Eisha and Abdel-Aal, 1995), Sharkia (Magda-Amin, 1992) and in carnivora in zoological gardens in Giza (Siam et al. 1994).

Table (2) displayed the occurrence of Giardia cysts (19.66%) in trapped rats and mice; 21.48, 25.55 and 9.33% in *Rattus rattus*, *Rattus norvegicus* and *Mus musculus* respectively. A finding substantiates what had been reported by Meywer and Jarrol (1982).

Faecal samples were collected from children affected with diarrhea at age group 1-10 years.

Table (3) shows a prevalence of 21% of Giardia lamblia cysts in children with diarrhea. The results obtained support what had been conducted

in Jamaica (Christie et al., 1988).

Giardia lamblia was detected in (22%) in preschool children complaining from diarrhea at age group 1-5 years. A finding which is almost to similar those obtained in Houston day care centers (Pickering et al. 1984) and in Lesotho preschool children (Esrey et al. 1989), where as it was higher than those reported in San Vicente De Paul University Hospital, Colombia (Hernandez et al. 1987) and in Ghana (Annan, 1985), and lower than those found in Turkey (Kocman et al., 1982), Bangladesh (Islam et al. 1983) and in Bilbies, Egypt (Dupont and Sullivan 1986).

In the present study Giardia lamblia is implicated as a cause of diarrhea in children at age group 5-10 years with a prevalence rate of 20%. A result obtained was lower than that recorded in children in public school in Chile (Cabrera et al. 1981).

Regarding experimental infection of rats and mice with Giardia lamblia cysts procured from children (Table 4), the prepatent and patent periods were nearly similar in *Rattus rattus*, *Rattus norvegicus* and *Mus musculus* after infection. Rats and mice inoculated with Giardia cysts and did not respond to a infection were killed and no Giardia cysts could be detected in their duodenal contents.

From the available literature, several studies reported the isolation of Giardia lamblia cysts from human and succeeded in experimental infection of animals. Mongrel dogs were experimentally infected with G.lamblia cysts

Table (1): Prevalence of Giardia cysts among examined pets in Kaliobia Governorate

Species of animal	Examined number	Positive samples	
		No.	%
Dogs	200	48	24
Cats	200	22	22
Total	400	70	17.5

Table (2): Prevalence of Giardia cysts among examined rodents in Kaliobia Governorate

Species of rodents	Examined number	Positive samples	
		No.	%
Rattus rattus	135	29	21.48
Rattus norvegicus	90	23	25.55
Mus musculus	75	7	9.33
Total	300	59	19.66

Table (3): Prevalence of Giardia cysts among examined children affected with diarrhea in in Kaliobia Governorate

Age group/year	Examined number	Positive samples	
		No.	%
1-5	200	44	22
5-10	200	40	20
Total	400	84	21

Table (4): Results of experimental infection of rodents with *Giardia* cysts recovered from children.

Species of rodents	No. of infective rats & mice/ control	No. of + ve/infective	Prepatent period/d.	Patent period/d.
<i>Rattus rattus</i>	5/2	3/5	7-12	19-23
<i>Rattus norvegicus</i>	5/2	4/5	6-10	18-30
<i>Mus musculus</i>	5/2	2/5	8-14	16-19

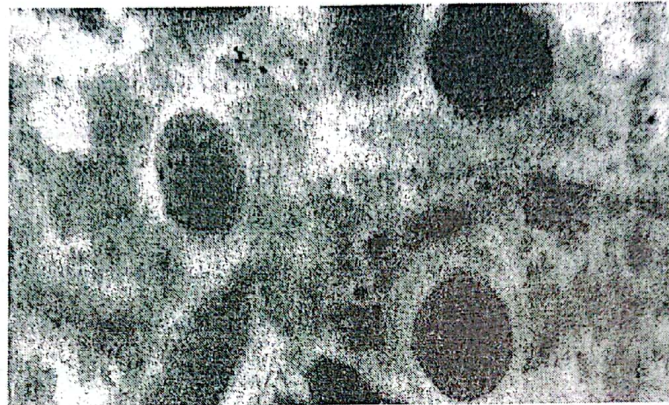


Fig (1) : *Giardia lamblia* cyst from human (X1250)

from human stool and trophozoites from axenic culture (Hewlett et al. 1982). Mongolian gerbils (Belosevic et al. 1983) and Swiss mice (Hill et al. 1983) responded to infection with *Giardia lamblia* cysts recovered from human. Moreover Siam et al. (1994) succeeded in experimental infection of Swiss mice with *Giardia* cysts obtained from zoo carnivora and their attendants.

In addition, recent researches indicated no difference between genotype of *Giardia* isolates obtained from human and animals and concluded that man and animals do not seem to possess their own unique species (Bertram et al. 1983, Nash et al. 1985 and Ey et al. 1996).

From Zoonotic point of view, infection with *Giardia lamblia* is not restricted to humans and can be transmitted to animals and possibly back to humans. Dogs and cats as pets should be considered as reservoir of infection. Rodents play a role in spread of infection through contamination of food and water sources.

REFERENCES

- Abou-Eisha, A.M. and Abdel-Aal, A.A. (1995): Prevalence of some zoonotic parasites in dog fecal deposits in Ismailia city . Assuit . Vet. Med. J. Vol. 33, No. 66 pp. 119.

- Acha, P.N. and Szyfres, B. (1989): Zoonoses and Communicable Diseases Common to Man and Animals, 2nd ed. Pan American Health Organization, Washington, USA.
- Aguilar, P., Pacheco, S. Reyes, L. Chinchilla, M: (1988) Prevalence of Coccidia & Giardia spp in dogs in Costa Rica. Veterinarians, Costa Rica, 10 (3): 15-17.
- Annan (1985): The socioeconomic determinants of malnutrition among preschool children in Ghana, Dissertation abstracts international B, (Science and Engineering .. 46 (1): 117.
- Belosevic, M., Faobert, G.M., Maclean, J.D., Law C., Croll, N.A. (1983): Giardia Lamblia infections in Mongolian gerbils: an animal model. J. Infect. Dis. 147: 222-226.
- Bertram, M.A., Meyer, E.A. Lile, J.D. Morse, S.A . (1983): A comparison of isozymes of five axenic Giardia isolates J. Parasitol. 69: 793-801.
- Bowman, D. and Lynn, R. (1995): Georgis, Parasitology for veterinarians 6th ed. W.B. Saunders Company, USA.
- Christie, C.C., Heikens, G.T. and Mcfarlane, D.E. (1988): Nosocomial and community acquired infection in nourished children. J. Trop. Med. Hyg. 91 (4): 173.
- Cobrerá, G., Pinilla, N., Porra, G. and Bull, F. (1981) : A coproparasitological survey of school children from the city of conception, Chile. Boletin Chilense de Parasitologia 36 (3/4): 53.
- Collyer, R.R., Lim, K.H. Tony, R. and Prociv, P. (1992): Suburban dogs as reservoir of human giardiasis. Med. J. Aust. 156 (11): 811-815.
- Dupont, H.L. & Sullivan, P.S. (1986): Giardiasis : the clinical spectrum, diagnosis and therapy. Pediatr. Infect. Dis. 5 (1): 131-138.
- Esrey, S.A., Collet, J. Miliotis, M.L., Koornhof, H.J. and Makhale, D. (1989): The risk of infection from G. lamblia due to drinking water supply, use of water and latrines among preschool children in rural Lesothos. Int. J. Epidemiol. 8 (1): 284.
- By, P.L; Bruder, T., Wehrli, C., Kohler, P. (1996): Comparison of genetic groups determined by molecular and immunological analysis of Giardia isolated from animals and humans in Switzerland and Australia . Parasitology Reserach 82 (1) 52-60.
- Guclu, F. and Aydenizoz, M. (1995): The prevalence of Parasites in the feces of dogs in Konya. Turkiye Parazitoloji Dergisi 19 (4):550-556.
- Hernandez, A.Z., Jaramillo, C.T., Ramez, R.S., Gomez, G.M. and Ranco, D.Z. (1987): Treatment of acute diarrhea in children A comparative study of three oral rehydration solutions and I.V. therapy in Colombia. Boletin de la Africana Sanitaria Panamericana 102 (6), 606.
- Hewlett, E., Andrews, J.S., Jr., Ruffier, J. and Schaefer, F.W. (1982): Experimental infection of Mongrel dogs with Giardia lamblia cysts and cultured trophozoites , J. Infect. Dis. 145 (1) 89-93.
- Hill, D.R., Guerrent, R.L., Pearson, R.D., Hewlett, E.I. (1983): Giardia lamblia infection of suckling mice. J. Infect. Dis. 147:217-221.
- Islam, A., Stoll, B.J., Ljungstrom, I (1983): Giardia lamblia infections in a cohort of Bangladeshi mothers and infants followed for one year. J. Pediatr. 103: 996-1000.
- Kocman, S, Kiranyez, G. and Soygi (1982): Treatment of intestinal helminth with mebendazole. Turkiye Parasitologyi Dergisi 5 (2),9.
- Magda Amin (1992): Zoonotic aspects of giardiasis. Zag. Vet. J. Vol. 20 No. 6pp. 929-937.
- Markell, E., Voge, M. and John, D. (1992): Medical Parasitology. 7th ed., W.B. Saunders Company.
- Meehan, A.P. (1984): Rats and Mice, Their Biology and Control. 1st ed. Rentokil limited, Flecourt, East Grainstead, W. Sussex RH. 192 JY.
- Vet.Med.J.,Giza.Vol.47,No.1(1999)

- Melloni, B.P., Thompson, R.C.A.; Hopkins, R.M.; Reynoldson, J.R. and Gracey, M. (1993); The prevalence of Giardia and other intestinal parasites in children, dogs and cats from Aboriginal communities in the Kimberley. *Med. J. of Aust.* 158 (3): 157-159.
- Meyer, E.A. & Jarrol, E.I. (1982): Giardiasis. In: Acha & Szyfres (1992).
- Nash, T.E. McCutchan, T., Keister, D., Dame, J.B., Conrord, J.D. and Gillin, F.D. (1985): Restriction-endonuclease analysis of DNA from 15 Giardia isolates obtained from humans & animals. *J. Infect. Dis.* 152 (1): 64-73.
- Pickering, L.K., Woodward, W.E. & Dupont, H.L. (1984): Occurrence of Giardia lamblia in children in day care center. *J. Pediatr.* 104: 522-526.
- Siam, M.A., Salem, G.H., Nahid Ghoneim, Michael, S.A. and Magda El-Refay (1994): Public health importance of enteric Parasitosis in captive carnivora. *Assiut Vet. Med. J.* 32 (63): 131-140.
- Soulsby, E.J.L. (1982): Helminths, Arthropods and Protozoa of Domesticated animals. 7th ed. USA., Philadelphia.
- Suobodova, V., Konvalinova, J., Svoboda, M. (1995): Coprological and serological finding in dogs and cats with giardiasis and cryptosporidiosis. *Acta Veterinaria Brno*, 64: 257-262.
- Swan, J.M. and Thompson, R.C.A. (1986): The prevalence of Giardia in dogs and cats in Perth, Western Australia. *Aust. Vet. J.* 63 (4), 110-112.
- Sykes, T.J. and Fox, M.T. (1989): Patterns of infection with Giardia in dogs in London. *Transactions of the Royal Society of Tropical Medicine and Hygiene.* 83 (2) 239-240.
- WHO (1983): A Guide for Elemental Methods in Laboratory Diagnosis. Swither. Genev. P. III 226: 360-366.