

Analysis of Parasitic Diseases Diagnosed by Tissue Biopsy Specimens at KyungHee Medical Center (1984-2005) in Seoul, Korea

Won-Hyung Choi^{1,*}, Jong-Phil Chu^{1,†}, Meihua Jiang¹, Yun-Sik Lee¹, Bum-Shik Kim²,
Deog-Gon Kim³ and Yong-Koo Park⁴

¹Department of Medical Zoology, KyungHee University School of Medicine, Seoul 130-701, Korea;

²Department of Chest Surgery, KyungHee University School of Medicine, Seoul 130-701, Korea;

³Department of Pediatrics, College of Oriental Medicine, KyungHee University, Seoul 130-701, Korea;

⁴Department of Anatomical Pathology, KyungHee University School of Medicine, Seoul 130-701, Korea

Abstract: We analyzed parasitic diseases diagnosed by tissue biopsy specimens at KyungHee Medical Center (KMC) from 1984 to 2005. The total number of parasite infection cases was 150 (0.07%) out of the total 211,859 biopsy specimens submitted for histopathological examinations. They consisted of 62 cysticercosis, 23 sparganosis, 16 paragonimiasis, 15 amebiasis, 11 anisakiasis, 11 clonorchiasis, 3 ascariasis, 2 scabies, 2 enterobiasis, 2 trichuriasis, 1 leishmaniasis, 1 taeniasis, and 1 thelaziasis. Out of 62 cysticercosis cases, 55 were detected in subcutaneous tissues or the central nerve system. Eighteen out of 23 sparganosis cases were involved in muscular and subcutaneous tissues. In most anisakiasis cases, the involved organ was the stomach. The lung and the pleura were the most common site of paragonimiasis. The incidence of parasitic diseases during the first 5 years (1984-1988) was the highest of all observed periods. After 1989, similar incidences were shown throughout the period. Whereas cysticercosis was diagnosed in 34 cases during 1984-1988, no case has been diagnosed since 2000. In the case of sparganosis, the chronological incidence was almost uniform throughout the period 1984-2005. Paragonimiasis showed a similar tendency to cysticercosis. In gender and age distribution of parasitic diseases, men showed higher incidence rates than females, and the age groups of the 40s or older indicated higher infection frequencies than other age groups. Therefore, these results are a significant report to appear the tendency of human parasitic disease diagnosed by tissue biopsy in association with parasitosis at KMC in Seoul.

Key words: parasite infection, cysticercosis, sparganosis, paragonimiasis, anisakiasis, clonorchiasis, biopsy

According to a remarkable economic growth and improvement of hygiene, parasite infection rates have been remarkably decreasing in Korea [1]. The decrease of parasitic infections is also due to better diagnostics and treatments along with introduction of new anthelmintic medicines, such as praziquantel, mebendazole, and albendazole. In particular, soil-transmitted parasitic diseases have declined remarkably, and some of food-borne parasites have also shown a decreasing trend. However, there are slight increasing patterns in the prevalence of *Clonorchis sinensis* nowadays [1].

Reports associated with zoonoses have mentioned only a few cases of tissue parasitic infections and the majority of these cases dealt with single diseases based on biopsy [2,3]. South Korea,

just like the rest of the world, has few reports that are relevant to tissue parasitic infections [4-8]. Therefore, in order to provide data on the trends and frequency of parasitic infections, we analyzed data of parasitic diseases diagnosed by tissue biopsy at KyungHee Medical Center (KMC) in Seoul from 1984 to 2005 (Table 1).

All diagnostic information for parasitic diseases was obtained from clinical and pathological records at KMC. Among 211,859 biopsy specimens submitted for histopathological examinations during 1984-2005, 150 (0.07%) were diagnosed as the parasitic infection. A total of 13 kinds of parasitic diseases were detected (Table 2). They included cysticercosis (62 cases), sparganosis (23 cases), paragonimiasis (16 cases), amebiasis (15 cases), anisakiasis (11 cases), clonorchiasis (11 cases), ascariasis (3 cases), scabies (2 cases), enterobiasis (2 cases), trichuriasis (2 cases), leishmaniasis (1 case), taeniasis (1 case), and thelaziasis (1 case). Analytical results of parasitic diseases showed a decreasing trend

• Received 10 July 2009, revised 30 November 2009, accepted 23 December 2009.

* Corresponding author (whchoi@khu.ac.kr)

† This author contributed as a co-corresponding author.

from 0.12% (1984-1994) to 0.04% (1995-2005).

Among 62 cases identified as cysticercosis, the involved sites included the subcutaneous tissues (28 cases; 45.2%), central nervous system (27 cases; 43.5%), and the body trunk (7 cases; 11.3%). Men showed a higher infection tendency with cysticercosis than women, with a ratio of 42 : 20 (Table 3). Among 23 cases identified as sparganosis, the sites were the subcutaneous

tissues (13 cases; 56.2%), lower extremities (4 cases; 17.4%), the body trunk (5 cases; 21.7%), and the pleura (1 case; 4.4%). With regard to age groups, sparganosis began to occur in the age group of the 30s, but most cases occurred in those who are the 40s or older. Out of the 16 cases identified as paragonimiasis, the pleural involvement was in 5 cases (31.3%), whereas the lung involvement was in 4 cases (25.0%). The rest of the cases was ectopic paragonimiasis; the involved sites were the subcutaneous tissues (2 cases; 12.5%), brain (2 cases; 12.5%), mesentery (2 cases; 12.5%), and common bile duct (1 case; 6.3%). Men showed a greater infection rate of paragonimiasis than females with the ratio of 10 : 6. Out of the 15 cases identified as amebiasis, the involved sites were the rectum (6 cases; 40%), colon (5 cases; 33.3%), and liver (4 cases; 26.7%). Men have a higher infection rate of amebiasis than females (11 : 4) (Table 3). Clonorchiasis was detected in the liver (5 cases; 45.5%), gall bladder (3 cases; 27.3%), common bile duct (2 cases; 18.2%), and the duodenum (1 case; 9%). The age onset of clonorchia-

Table 1. Five-year incidence of parasitic diseases diagnosed from biopsy specimens of KMC^a during the period 1984-2005

Year	No. of surgical specimens	No. of parasitic diseases	Percentage (%) of parasitic diseases
1984-1988	36,014	70	0.19
1989-1993	43,534	29	0.07
1994-1998	48,057	22	0.05
1999-2003	56,857	15	0.03
2004-2005	27,397	14	0.05
Total	211,859	150	0.07

^aKyungHee Medical Center.

Table 2. Annual incidence of parasitic diseases at KMC^a (1984-2005)

Disease	Year																				Total		
	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03		04	05
Cysticercosis	11	7	9	2	5	3	4	3	5	1	3	4	2	1		2							62
Sparganosis	3		3		2		1	1		1			2		1	1	1		2	1	2	2	23
Paragonimiasis	5	1	2	1			1		1	2	1		1				1						16
Amebiasis	3			1	2	1	1	1		1				1					1		1	2	15
Anisakiasis													1	1			2	1			1	4	11
Clonorchiasis	1	1		2	1		1		1		1	1				1	1						11
Ascariasis	1				1										1								3
Scabies				2																			2
Enterobiasis	1															1							2
Trichuriasis																							2
Leishmaniasis			1																				1
<i>T. saginata</i> ^b					1																		1
<i>T. callipaeda</i> ^c	1																						1
Total	26	10	14	8	12	4	8	5	7	5	5	5	6	4	2	6	4	0	3	2	7	7	150

^aKyungHee Medical Center; ^b*Taenia saginata* (Most cases may have been *Taenia asiatica*); ^c*Thelazia callipaeda*.

Table 3. Age and sex distribution of parasitic disease patients at KMC^a (1984-2005)

Disease	Age/Sex		20-29	30-39	40-49	50-59	Over 60	Unknown	Total ^b
	Under 10	10-19							
	M/F	M/F	M/F	M/F	M/F	M/F	M/F	M/F	M/F
Cysticercosis	1/0	0/3	4/6	5/4	16/2	10/3	5/1	1/1	42/20
Sparganosis	0/1	0/0	0/0	2/2	1/3	7/2	3/2	0/0	13/10
Paragonimiasis	0/0	0/0	2/1	1/0	2/2	1/2	4/1	0/0	10/6
Amebiasis	0/0	0/0	1/0	4/0	2/3	1/0	3/1	0/0	11/4
Anisakiasis	0/0	0/0	0/0	2/1	3/1	2/0	1/1	0/0	8/3
Clonorchiasis	0/0	0/0	0/0	1/0	2/1	3/0	4/0	0/0	10/1
Total	1/1	0/3	7/7	15/7	26/12	24/7	20/6	1/1	94/44

^aKyungHee Medical Center; ^bParasitic diseases each with less than 10 cases are not included in this table (total 12 cases were excluded).

sis was the 30s and the age group of the 60s indicated the highest infection rate. Out of the 11 cases identified as anisakiasis, the majority of the cases were located in the stomach (10 cases; 91%) and only 1 case was detected in the ascending colon (9%).

Our results showed a significant decreasing trend of tissue parasitic diseases at KMC especially from 1984 to 2001. However, this trend is not shown in sparganosis, amebiasis, and anisakiasis. A previous report from KMC [9] indicated increasing trends except for anisakiasis and enterobiasis during 1972 to 1983. Put together, it has been shown that tissue parasitic infections have decreased over the previous 30 years among the patients who visited KMC. A similar national trend has been reported on the prevalence of intestinal helminths among Korean people by the Korea Center for Disease Control and Prevention, which was reported by Kim et al. [1]. According to their statistics, the overall helminth egg positive rate was 41.1% in 1981, 12.9% in 1986, 3.8% in 1992, 2.4% in 1997, and 3.7% in 2004 [1]. These data indicate that helminth infections are gradually decreasing among the Korean people during the past 20 years, except in 2004.

The most common site of cysticercosis is known to be the soft tissues [6], which include subcutaneous tissues, to which our study agrees. The central nervous system (CNS) was the second frequent location of cysticercosis. When juxtaposed with the previous reports, it can be said that the incidence of cysticercosis is quite persistent [6,7,9,10], in spite that the prevalence of the adult tapeworm, *Taenia solium*, became negligible [1]. However, there are only a few reports of cysticercosis diagnosed by tissue biopsy after the 1990s; hence, it seems difficult to predict the nationwide trend of the prevalence of cysticercosis. Nowadays, advancements in medical technology, such as magnetic resonance imaging (MRI) and computed tomography (CT), have led to higher diagnostic and detection rates of tissue helminth infections such as cysticercosis. According to several previous reports [6,8,9], infection rates of cysticercosis were higher in women than in men. However, in our study, infection rates of cysticercosis were higher in men than in women. Our study agrees to a previous research that showed a higher allotment rate of cysticercosis in men [11].

According to several research reports from 1924 to 1991, infections by sparganum had continually occurred in Korea [7,12,13]. In our previous research [9], 10 cases of sparganosis were discovered, yet in the present study 23 cases were detected. The infection rates of paragonimiasis were relatively high with many cases reported in endemic areas from the 1950s to 2002 [7,8,14-17]. Our study detected 16 cases of paragonimiasis, which is

not a small number compared with our tissue parasitoses.

Total 11 cases of clonorchiasis were found in our study, whereas 73 cases were detected in our previous research [9]. This shows that the infection rate of clonorchiasis is decreasing among the patients at KMC. By contrast, surveys in different endemic areas displayed that the egg positive rates of clonorchiasis were variable; 37.6% in Sanchong-gun in 1992 [18], 9.3% in Okcheon-gun in 2002 [19], and 34.4% in a riverside rural area of Kyongsangnam-do in 2005 [20]. These data at least suggest that clonorchiasis is one of the parasitic diseases with no decreasing tendency in endemic areas.

In conclusion, as shown in the results of parasitic infections diagnosed by tissue biopsy during the past 22 years (1984-2005) at KMC, the frequency of parasitic infections shows an evident decreasing tendency except for several zoonotic infections, including sparganosis and anisakiasis. Therefore, this study indicates that more broad researches, social awareness, and educations for prevention are necessary to further improve parasitic diseases in Korea.

ACKNOWLEDGEMENTS

This research was supported by KyungHee University and KyungHee Medical Center.

REFERENCES

1. Kim DS, Cho SH, Huh S, Kong Y, Sohn WM, Hwang SS, Chai JY, Lee SH, Park YK, Oh DK, Lee JK, Working Groups in National Institute of Health and Korea Association of Health Promotion. A nationwide survey on the prevalence of intestinal parasitic infections in the Republic of Korea, 2004. *Korean J Parasitol* 2009; 47: 37-47.
2. Rubin A. Filariasis in a tourist diagnosed by fine needle aspiration cytology. *Cytopathol* 2002; 13: 383-384.
3. Chae SW, Choi JH, Lee DJ, Lee HM. Sparganosis presenting as a lateral neck mass. *Head Neck* 2003; 25: 74-76.
4. Min DY, Ahn MH, Kim KM, Kim CW. Intestinal parasite survey in Seoul by stool examination at Hanyang University Hospital. *Korean J Parasitol* 1986; 24: 209-212.
5. Kim BJ, Ock MS, Kim IS, Yeo UB. Infection status of *Clonorchis sinensis* in residents of Hamyang-gun, Gyeongsangnam-do, Korea. *Korean J Parasitol* 2002; 40: 191-193.
6. Chi HS, Chi JG. A histopathological study on human cyticercosis. *Korean J Parasitol* 1978; 16: 123-133.
7. Chi JG, Sung RH, Cho SY. Tissue parasitic diseases in Korea. *J Korean Med Sci* 1988; 3: 51-62.
8. Kim J, Chung WS, Cho KH. Status of parasitic infection diagnosed

- by surgical biopsy in Kwangju and Chollanam-do. *Korean J Parasitol* 1994; 32: 93-100.
9. Cho YJ, Chu JP, Yang MH, Lee JH, Jeong GS. Analysis of parasitic diseases by biopsy in Kyunghee Medical Center (1972-1983). *Korean J Infect Dis* 1998; 30: 173-179.
 10. Lee KT, Kim CH, Park CT, Lee MY. Cysticercosis and taeniasis in Chollapukdo Province. *Korean J Parasitol* 1966; 4: 39-45.
 11. Rim HJ, Lee JS, Joo KH, Kim SJ, Won CR, Park CY. Therapeutic trial of praziquantel (Embay 8440; Biltricide®) on the dermal and cerebral human cysticercosis. *Korean J Parasitol* 1982; 20: 169-190.
 12. Lee BJ, Ahn SK, Kim SC, Lee SH. Clinical and histopathologic study of sparganosis. *Korean J Dermatol* 1992; 30: 168-174.
 13. Cho SY, Bae JH, Seo BS. Some aspects of human sparganosis in Korea. *Korean J Parasitol* 1975; 13: 60-77.
 14. Park CK. Clinical studies of paragonimiasis 1. Clinical observation of paragonimiasis: report of 245 cases. *Chong-Hap-Eui-Hak* 1963; 8: 93-107 (in Korean).
 15. Rim HJ, Lee JS, Chung HS, Hyun IC, Chung KH. Epidemiological survey on paragonimiasis in Kang-Hwa Gun. *Korean J Parasitol* 1975; 13: 139-151.
 16. Shin K. An epidemiological study of clonorchiasis sinensis and paragonimiasis westermani prevailed among the people of a rural county. *Korean J Prev Med* 1977; 10: 71-79.
 17. Min DY, Ryu JS, Ahn MH, Choi HK, Kang SI, Shin MH. Present status of human paragonimiasis and intestinal parasitic infections in Bokildo (Islet), Korea. *Korean J Infect Dis* 2002; 34: 230-234.
 18. Lee JS, Lee WJ, Kim TS, In TS, Kim WS, Kim SK. Current status and the changing pattern of the prevalence of clonorchiasis in the inhabitants in Sanchong-gun, Kyongsangnam-do, Korea. *Korean J Parasitol* 1993; 31: 207-213.
 19. Lee GS, Cho IS, Lee YH, Noh HJ, Shin DW, Lee SC, Lee TY. Epidemiological study of clonorchiasis and metagonimiasis along the Geum-gang (River) in Okcheon-gun (county), Korea. *Korean J Parasitol* 2002; 40: 9-16.
 20. Ju YH, Oh JK, Kong HJ, Sohn WM, Kim JI, Jung KY, Kim YG, Shin HR. Epidemiologic study of *Clonorchis sinensis* infestation in a rural area of Kyongsangnam-do, South Korea. *J Prev Med Pub Health* 2005; 38: 425-430.