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Epidemiological studies of *Entameba histolytica* and other intetinal Parasites in Ulchin county, Kyungpook Province, Korea*

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=國文抄錄=

慶北 蔚珍郡 住民들에 있어서 痢疾아메바 및 腸內寄生虫 疫學的 調査

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蔚珍郡 住民들에서의 痢疾아메바 및 腸內寄生虫 感染狀을 알아보기 위해 1986年 5月부터 同年 10月까지 蔚珍郡 7個洞 住民을 調査對象으로 選定하여 formalin-ether 集卵法으로 集卵한 後, Lugol 씨液으로 染色하여 原虫類胞囊과 蠕虫類卵를 調査하였다.

總被檢者 819名中 痢疾아메바 胞囊檢出率은 5.4%, 大腸아메바의 그 率은 2.2%, 小形아메바와 沃度아메바는 各各 2.3%, 0.4%였다.

痢疾아메바의 性別 檢出率에 있어서는 男女間에 有意的 差를 認定할 수 없었으며, 年齡別로는 30—39세 群에서 最大値, 60세 以上群에서 最少値를 나타내었다.

腸內 蠕虫類 感染率에 있어서는 鞭虫이 21.9%로 가장 높았으며, 그 다음은 12.1%를 나타내는 蛔虫이었고 條虫은 0.2%로 가장 낮았다.

性別感染率에 있어서는 女子의 경우, 蛔虫, 鉤虫, 毛樣線虫등은 男子에 比해 그 率이 다소 높았으나, 肝吸虫, 肺吸虫은 男子가 女子에 比해 그 率이 높았다.

混合寄生狀에 있어서는 1種寄生이 가장 많았고, 다음은 2種의 重複寄生이었으며, 4種의 混合寄生은 매우 적었다.

以上의 成績으로 미루어보아 蔚珍郡民들에서의 腸內 寄生 原虫類와 蠕虫類 感染은 아직도 高率임을 알수 있었다.

Introduction

Epidemiological, clinical, and therapeutic studies on the ***Entameba histolytica*** and other intestinal parasites in Korea have been carried out by many investigators since Kessel's first report on this protozoan infection among residents in Seoul, Korea in 1925.

Choi(1926) studied the incidence of intestinal protozoa and helminths among Koreans, and reported 1.5 per cent of positive rate among 2,000 fecal specimens by single direct smear, whereas 30.2 per cent was positive in the Seoul area after six repeated examinations.

From research on intestinal parasites in the

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Seoul area, Soh et al. (1961) found *E. histolytica* in 4.3 per cent among Severance Hospital outpatients, and no special age and seasonal differences were noted among amebiasis patients. However, Yoon and Choi (1966) in a study on clinical observation on the amebic dysentery cases among children found that clinical cases were predominant during the summer season.

As a part of a nation-wide survey on the status of intestinal protozoa infections in Korea, Lee (1969) reported the high infection rate of *E. histolytica* among residents and draftees in the recruitment camp in Kyungpook Province.

Afterward, in studies on *E. histolytica* and other intestinal parasites among residents in this Province, results in Kyungpook National University Hospital patients have been reported by Choi et al. (1971), Lee (1979), and Kwon (1982); in Kyungsan county by Kim et al. (1971); in urban and rural school children by Choi and Hwang (1980); and in Taegu city by Joo (1984).

However, few reports on epidemiological study of *E. histolytica* and other intestinal parasites except *P. westermani* among residents in Ulchin county of Kyungpook Province have been available.

The present paper is an attempt to obtain information concerning the infection rate of *E. histolytica* and other intestinal parasites among residents of Ulchin county and to know other data which might be pertinent to the prevention and eradication of parasitic diseases.

Materials and Methods

Survey areas:

Ulchin county, Kyungpook Province which was incorporated from Kangweon Province since 1963, was selected as area of survey. It is located in the northeast part of Kyungpook Province at 36.1—37.8 degrees of north latitute, and has a total annual rainfall of 1,088mm, a mean temperature of 13.6°C and is characterized by wide seasonal temperature variations (−6.3 to 28.3°C). The population is 88,000 in the county, almost equally distributed between mountainous and coastal areas. The geographical locations surveyed were presented by Joo et al. (1985) (Fig. 1.).

Parasitological methods:

During the period from May to October in 1986, the authors carried out a parasitological survey in order to estimate *E. histolytica* and other intestinal parasitic infections among residents in Ulchin county.

A total of 819 fecal specimens were collected from 422 males and 377 females aged from 3 to 70 years living in seven locations of the county.

The specimens were collected in cardboard cartons and brought to the laboratory. The

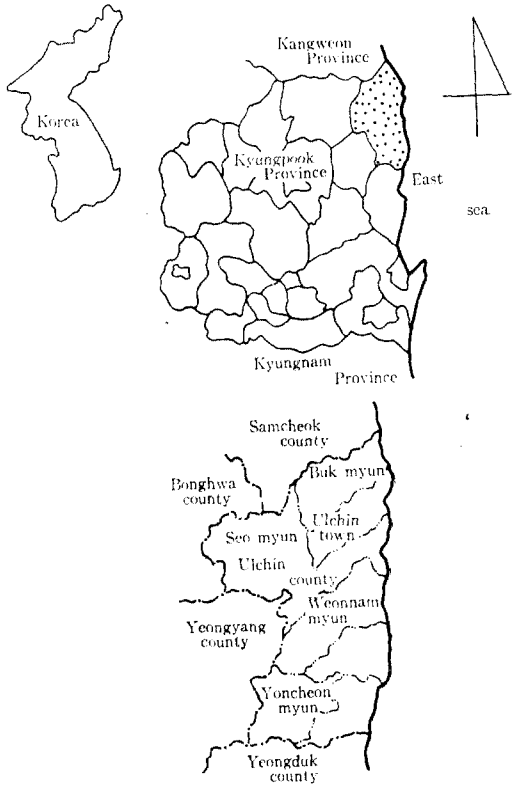

Fig. 1. Surveyed areas in Ulchin county, Kyungpook Province.

specimens were examined within 24 hours after collection. Since trophozoites disintegrate within short times, only cysts were examined in solid stools. The formalin-ether sedimentation method (Ritchie, 1948) was used to recover protozoan cysts and helminthic eggs.

One drop of the sediment was first placed on a microscopic slide and one drop of Lugol's iodine solution was mixed. The preparation was mounted with a cover slip, and the entire area was examined for cysts and eggs.

When *E. histolytica* cysts were found, the size of a sufficient number of cysts were measured with a micrometer to determine the relaitve prevalence of large and small races, cysts measuring smaller than 10 micron being assigned to the latter.

Results

Table 1 lists the species and prevalence of intestinal protozoan cysts and helminthic aggs detected in 819 persons in Ulchin county. Five species of intestinal protozoa were found, as well as eggs of nine helminths. Of the protozoa, *E. histolytica* was found most frequently, in 5.4 percent of the residents, followed by *E. nana* with 2.3 percent, and *E. coli* with 2.2 percent.

Iodameba bütschlii was the least prevalent species. Both large and small races of *E. histolytica* were observed. Twenty-three individuals had large race cysts only; 13 small race cysts only; and 8 both large and small race cysts.

Among the 819 fecal specimens examined, one or more species of helminths were found in 233, which becomes an overall prevalence of 28.4 percent. The prevalence of *T. trichiura* was the highest, being found in 21.9 percent, and *A. lumbricoides* being next in positive rate, 12.1 percent. Hookworm and *Trichostrongylus* species were unexpectedly the least prevalent. *Taenia* species was detected from only 0.2 percent of the residents. *P. westermani* was the most frequently found in 2.7 percent of the population as compared with 0.7 percent for *C. sinensis* and 1.1 percent for *M. yokogawai*.

As to the sex-specific rate of overall parasite infections, females were a little higher than males, while in the cases of *E. histolytica*, *G. lamblia*, *C. sinensis*, and *P. westermani*, the infection rates in males were higher than in females.

The data shown is Table 2 present the prevalence of the common three intestinal parasites; *E. histolytica*, *A. lumbricoides*, and *T. trichiura*, by sex and age groups. The prevalence of *E. histolytica* was 5.2 percent and 7.6 percent in 0—9 year age group, and reached its maximum level of nearly 10.0 percent in the 30—39 year age group in both sexes, and followed by a gradual decreased rates.

T. trichiura was the most prevalent in the 0—9 and 10—19 year age groups with almost the same prevalence in males and females of all age groups.

A. lumbricoides infections showed the same pattern as *T. trichiura* having their higher prevalence in the young age groups of both sexes.

Only small differences in sex prevalence of *E. histolytica*, *A. lumbricoides*, and *T. trichiura* were seen in the various age groups but these may have been due to chance as the overall prevalence in the sexes was about the same.

Since few individuals had other intestinal parasites, no reliable age or sex distributions could be determined.

The distribution of parasites harboured by 292 persons are shown in Table 3. One hundred and eightyone persons were found to harbor single species of parasites, 91 harbored two, 17 harbored three, and 3 were positive for four species of parasites.

It was shown that *T. trichiura* had the highest prevalence in 29.5 percent of all single

Table 1. Prevalence of intestinal protozoa and helminths among residents in Ulchin county, Kyungpook Province, Korea (1986)

Species	Male		Female		Total	
	No. infected	Percent positive	No. infected	Percent positive	No. infected	Percent positive
Protozoa						
Entameba histolytica						
Large race only	13	2.9	10	2.7	23	2.8
Small race only	9	2.0	4	1.1	13	1.6
Both LR and SR*	2	0.5	6	1.6	8	1.0
Entameba coli	7	1.6	11	2.9	18	2.2
Endolimax nana	9	2.0	10	2.7	19	2.3
Iodameba bütschlii	—	—	3	0.8	3	0.4
Giardia lamblia	7	1.6	1	0.3	8	1.0
Helminth						
Ascaris lumbricoides	49	11.1	50	13.3	99	12.1
Clonorchis sinensis	6	1.4	—	—	6	0.7
Enterobius vermicularis	2	0.5	1	0.3	3	0.4
Hookworm	—	—	3	0.8	3	0.4
Metagonimus yokogawai	5	1.1	4	1.1	9	1.1
Paragonimus westermani	15	3.4	7	1.9	22	2.7
Taenia species	1	0.2	1	0.3	2	0.2
Trichostrongylus species	1	0.2	4	1.1	5	0.6
Trichuris trichiura	99	22.4	80	21.2	179	21.9
Total No. examined	442		377		819	

* Both LR and SR: Both large race and small race.

Table 2. Infection rates for *E. histolytica*, *A. lumbricoides* and *T. trichiura* by sex and age groups among residents of Ulchin county (1986)

Age group (Y)	Sex	No. tested	*E. histolytica*		*A. lumbricoides*		*T. trichiura*	
			No.	%	No.	%	No.	%
0—9	M	77	4	5.2	13	16.9	27	35.1
	F	66	5	7.6	20	30.3	25	37.9
10—19	M	161	9	5.6	32	19.9	60	37.3
	F	145	9	6.2	26	17.9	46	31.7
20—29	M	39	3	7.7	—	—	2	5.1
	F	31	1	3.2	—	—	1	3.2
30—39	M	39	3	7.7	—	—	3	7.7
	F	17	2	11.8	—	—	1	5.9
40—49	M	55	2	3.6	3	5.5	3	5.5
	F	35	1	2.9	2	3.6	3	8.6
50—59	M	43	2	4.7	1	2.3	3	7.0
	F	40	1	2.5	1	2.5	3	7.5
60—	M	28	1	3.6	—	—	1	3.6
	F	43	1	2.3	1	2.3	1	2.3
Total	M	422	24	5.4	49	11.1	99	22.4
	F	377	20	5.3	50	13.3	80	21.2

Table 3. Various parasitic infections found among 292 positive cases of residents in Ulchin county (1986)

	Parasites found	cases
Single species	*Entameba histolytica*	21(7.2)*
	Entameba coli	6(2.1)
	Endolimax nana	12(4.1)
	Giardia lamblia	2(0.7)
	Ascaris lumbricoides	25(8.6)
	Clonorchis sinensis	3(1.0)
	Metagonimus yokogawai	6(2.1)
	Paragonimus westermani	17(5.8)
	Trichostrongylus species	3(1.0)
	Trichuris trichiura	86(29.5)
Two species	*E. histolytica* & *E. coli*	3(1.0)
	E. histolytica & *E. nana*	2(0.7)
	E. coli & *E. nana*	1(0.3)
	E. histolytica & *A. lumbricoides*	5(1.7)
	E. histolytica & *T. trichiura*	4(1.4)
	G. lamblia & *T. trichiura*	3(1.0)
	A. lumbricoides & *T. trichiura*	58(19.9)
	C. sinensis & *T. trichiura*	2(0.7)
	Other combinations	13(4.5)
Three species	*E. histolytica*, *E. coli*, & *G. lamblia*	1(0.3)
	E. histolytica, *E. coli*, & *I. bütschlii*	1(0.3)
	E. histolytica, *E. coli*, & *T. trichiura*	2(0.7)
	E. histolytica, *A. lumbricoides*, & *T. trichiura*	6(2.1)
	A. lumbricoides, *T. trichiura*, & *P. westermani*	3(1.0)
	A. lumbricoides, *T. trichiura*, & *Trichostrongylus* species	2(0.7)
	Other combinations	2(0.7)
Four species	*E. histolytica*, *E. coli*, *E. nana*, & *I. bütschlii*	1(0.3)
	E. histolytica, *E. coli*, *A. lumbricoides*, & *T. trichiura*	1(0.3)
	E. histolytica. *A. lumbricoides*, **Hookworm**, & *T. trichiura*	1(0.3)
Total		292

* Number in parentheses indicates percentage to total No. infected.

infections by intestinal parasites and followed by *A. lumbricoides* in 8.6 percent and *E. histolytica* in 7.2 percent.

Of all double infections, the combination of *A. lumbricoides* and *T. trichiura* was found in 19.9 percent. In these instance, the percentage of *E. histolytica* infection in combination with other intestinal parasites was higher than that of *E. coli* combined with others.

Discussion

The epidemiological studies of *E. histolytica* and other intestinal parasites in Kyungpook Province, Korea were instituted mostly in the limited locations or communities of Kyungsan county (Kim et al., 1971 ; Seo et al., 1969), Yeongcheon county (Nishimura, 1943 ; Seo et al., 1969), Chilgok county (Seo et al., 1969), Seonsan county (Lee, 1969 ; Seo et al., 1969), Yeongdeok county (Choi and Hwang, 1980), Wiseong conuty (Lee, 1969), and Taegu city (Matsumoto, 1915 ; Nishimura, 1943 ; Choi et al., 1971 ; Lee, 1979 ; Choi and Hwang, 1980 ; Kwon, 1982 ; and Joo, 1984).

From these studies, the prevalence of *E. histolytica* and other intestinal parasites among residents in Kyungpook Province was found to be high.

Ulchin county is situated in the hilly and mountainous district of the northeast part of Kyungpook Province which was incorporated from Kangweon Province in 1963. Therefore, the details of the epidemiology of *E. histolytica* and other intestinal parasites except *P. westermani* have not yet been studied for residents in this county.

In the studies on *E. histolytica* and other intestinal parasites among residents in this Province, Nishimura (1943) carried out a survey on the incidence of intestinal parasites among residents in Taegu and Yeongcheon areas, by stool examination, and reported for the first time that the prevalence of *E. histolytica* was found to be 12.3 percent in 236 Koreans and 1.5 percent in 67 Japanese.

After the Korean war, Lee (1969) conducted a nation-wide survey on the status of intestinal protozoan infections in Koreans, and reported that the rate for *E. histolytica* among residents in Wiseong and Seonsan counties was 3.6 percent. He also stressed that the infections of amebiasis among residents could be avoided by public health education with specific drug administration for amebiasis carriers and effective environmental sanitation.

Subsequently, Choi et al. (1971) made an extensive survey on the intestinal parasites among patients visited to Kyungpook National University hospital, and found that the prevalence of *E. histolytica* was 11.7 percent in 2,414 persons examined. They also commented that there were no differences in the rate of infection of residents and fecal contamination of vegetables during the past 30 years, and Kim et al. (1971) in a study of intestinal parasites in Kyungsan county, Kyungpook Province also recognized such considerations.

Recently, Kwon (1982) carried out a survey of intestinal protozoan infections in the clinical cases of in-and out-patient clinics of Kyungpook National University hospital, and reported that the demonstration rate of *E. histolytica* was 54.6 percent in 2,083 fecal specimens examined and there were no specific sex, age groups and seasonal differences in the rate of infection.

The prevalence of *E. histolytica* in this survey, 5.4 percent is not excessively high as compared with results of other surveys for amebic infections among residents in Kyungpook Province.

Choi et al. (1971) reported an infection rate of 11.9 percent in their investigation, and Choi and Hwang (1980) found 26.9 percent of urban and rural school children to harbor *E. histolytica.*

Similarly, our results fall well within the range of Lee's (1969) survey of the Wiseong and Seonsan counties, and Soh's (1981) summary for the Koreans. The 50.0 percent amebic infection rates reported by Lee (1979) and Kwon (1982) for a group of in-and out-patient clinics not approximated.

In the present survey, the prevalence of small rece *E. histolytica* was lower than that of the large race, and the rate of *E. coli* was much less prevalent than those reported by previous investigators (Nishimura, 1943 ; Lee, 1969 ; Choi et al. ; 1971 ; Kim et al., 1971 ; and Kwon, 1982).

The *Endolimax nana* cysts observed were frequently of the small race. Often the cysts were found in large numbers. As Wilks and Sonnenberg (1956) indicated, by viture of the fact that the size of the *E. nana* cysts approximates that of the small race *E. histolytica* cysts, it would be possible for inexperienced technicians to fail to detect the latter, when confronted with a microscopic field dense with *E. nana* cysts and with only a few *E. histolytica* cysts scattered among them.

This size relationship required that the closest scrutiny should be applied to each microscopic field when such mixed infections

were encountered. The prevalence given for the common intestinal helminths, *A. lumbricoides*, hookworm, *Trichostrongylus* species, and *T. trichiura* in this survey are considerably lower than those recorded in similar previous surveys made in Kyungpook Province (Seo et al., 1969 ; Lee, 1969 ; and Kim et al., 1971), and are similar to data reported by Joo (1984) in Taegu city.

As Joo (1984) indicated, the exact causes of the lower prevalence of the soil-transmitted helminths are possibly related to enviromental factors, i.e., public health education, specific anthelminthic administrations, improved hygiene and dietary life.

In this study, *E. vermicularis* and *P. westermani* infections were found in 3 and 22 cases, with prevalence rates of 0.4 percent and 2.7 percent, respectively.

However, this is no indication of the true prevalence among residents in Ulchin county, as the stool examination is unsuitable for determining the infection rate of these parasites.

It has been known that pinworm and lung fluke eggs in stool examinations are not found in more than 10 percent of infected individuals, and that special techniques for detection of pinworm and lung fluke infections were not employed, so only a few of these were found.

Summarizing the results, this study indicated that the infection rate of *E. histolytica* and other intestinal parasites among residents in Ulchin county is still high, and the high frequency of asymptomatic single and multiple parasitic infections in residents suggested that transmission hazards were given greater recognition.

Summary

A study of *Entameba histolytica* and other intestinal parasites in Ulchin county, based on fecal specimens examined each individuals, revealed the prevalence of *E. histolytica* to be 5.4 percent.

The prevalence of *E. histolytica* reached a maximun of about 10.0 percent in the 30--39 year age group in both sexes and subsequently declined.

Infection rates of other intestinal protozoa were commensurately low, and a similar rates in both sexes were observed.

T. trichiura was the most frequent helminthic parasite being found in 21.9 percent of the residents, followed by *A. lumbricoides* with the rate of 12.1 percent.

Only small differences in sex-specific rates of *E. histolytica* and other intestinal parasites were seen in the various age groups but these may have been due to chance as the overall prevalence in the sexes was about the same.

It was concluded that although the infection rates of *E. histolytica* and other intestinal parasites among residents in Ulchin county is still high, and eradication of these parasitic disease seems to be possible with addministration of specific drugs, in combination with extensive public health education and improvement of the dietary life.

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