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Significance of Scotch-tape Anal Swab Technique in Diagnosis of *Enterobius vermicularis* Infection*

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INTRODUCTION

In *Enterobius vermicularis* infection, the finding of eggs in perianal area does not necessarily mean the worm or worms are present in host's intestine because the female worm which discharged ova, thus being recovered by anal swab, already terminated the infestation in the host (Faust et al., 1971; Akagi, 1973). In other words, the detection of ova in perianal region is a diagnosis of terminated parasitism and its relation with present infestation in host's intestine is another matter. The relation between positive result of anal swab and present infection is influenced by factors of interval of reinfection, size of one brood of infection and other factors.

But positivity of anal swab for ova of *E. vermicularis* is still the very important landmark and tool in evaluating the epidemiological characters of pinworm infection in a community and in clinical diagnosis of infected individuals because no other approaches are readily available now. In this connection, the meaning of positive results of anal swab in epidemiological point of view must be evaluated in different way from the results of stool examination which conferred diagnostic meaning on some kinds of intestinal parasitism, because the meaning of anal swab is far from the incidence or prevalence rate of enterobiasis in a community. To overcome this discrepancy, some workers tried repeated examinations of anal swab to relate the results to the prevalence rate of enterobiasis in a community (Sadun et Melvin, 1955; Moriya, 1956).

To figure out the prevalence rate of *Enterobius vermicularis* infection in a community which is defined as "the proportion of population who harboured *E. vermicularis* at a certain point of time", the present authors tried treatment with pyrantel pamoate to all of the community members disregard of the results of anal swab. The results of pinworm collection were compared with those of the one or two time anal swabs in three communities.

MATERIALS AND METHODS

1. Surveyed areas and subjects: Three communities in Korea were selected for this study without any predilection of selection.

One of orphanage institutes situated in Anyang, a satellite city of Seoul was subjected in the first trial of this study. In this institute, there lived 82 orphan children of 7-18 years old of either sex. The whole of children were lived in 4 wards which were subdivided into 3 rooms in each wards. Each of the wards were provi-

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ded with good facilities of dining room, water supply with bath room and latrines. The children were trained sanitary behaviors such as weekly bathing and washing of hands before eating. And the linnen and underwear were provided with weekly interval in winter season. All of the children in this orphanage institute were surveyed on November 1975.

A small isolated village in mountainous part of Kangwon Do (Province) was subjected in the second trial. This village is situated in a valley surrounded by mountains of 500–600 meters high. This village is consisted of about 80 households and total population was about 450. Each of households have average two living rooms and in winter season all of the family members except aged grand parents, dwelt in one room. Young parents take care their children in their own room. The sanitary facilities in this village were very poor in both bathing facility and latrines either in each households or in common use. Usually rural inhabitants in this village bath only 2–3 times during 4 months period of long and cold winter season. Randomly selected 11 households of 41 members from 1 to 63 years-old of either sex were studied. This village was surveyed on late November 1975.

Another small rural village in Kyongsang Nam Do (Province) was studied in the third trial. The general sanitary status and living standards are not differed from that of the village subjected in the second trial. This village was consisted of about 60 households with population about 350. 35 children under 15 years-old of either sex in this village was subjected in the third trial undertaken on early December 1975.

2. Anal swab: Strips of Scotch cellulose adhesive tape, 2×7cm in dimension, serially numbered were held adhesive-side-out ever the wooden tongue depressor by fingers and swab perianal region (Graham, 1941). Only one swab was taken from each of the subjects in former two trials. In the third trial, children in rural village of Kyongsang Nam Do was examined successive two days each time by two swabs. The swabs from children in orphanage institute in Anyang City were taken from 16 : 00 to 19 : 00. All of the children bathed 1 to 7 days before the examination. The rural village population in Kangwon Do were examined on 08 : 00—20 : 00. The children in rural village of Kyongsang Nam Do were examined 08 : 00—10 : 00 in each days.

3. Treatment and collection of intestine-dwelling *Enterobius vermicularis*: Pyrantel pamoate, a broad-spectrum anthelminthic also effective in treatment of enterobiasis was used by only single dose of 10.0—12.5mg/kg of body weight to treat the surveyed subjects. The drug was administered just after the anal swab to all of the surveyed subjects disregard the results of anal swab.

Whole of the passed stool during consecutively 2 or 3 days after the drug administration were collected in polyvinyl pockets of 30×30cm separately by day and transported to the laboratory in Seoul.

The collected stool specimens were washed out fecal material. The unfiltered stool remnants were collected and fixed with sufficient amount of 10% formalin. Worms of fixed *E. vermicularis* were collected from fixed stool on black background with naked eyes and confirmed by observation under stereo-microscope.

RESULTS

1. Results of Scotch-tape anal swab and pinworm collection: The results of Scotch-tape anal swab in three communities were presented in Table 1. In orphanage institute of Anyang City, only two age-brackets were surveyed and

Table 1. Age adjusted positive rate of Scotch-tape anal swab examination in two communities of this study

Age group (years)	Orphanage institute in Anyang City		Rural community in Kangwon Do		Rural community* in Kyongsang Nam Do	
	No. exam.	Positive (%)	No. exam.	Positive (%)	No. exam.	Positive (%)
0—9	14	57.1	15	73.3	24	58.3
10—19	68	51.4	7	71.4	11	54.5
20—29	—		4	0	—	
30—39	—		6	33.3	—	
40 and over	—		9	44.4	—	
Total	82	52.4	41	53.6	35	57.1
Male	30	56.7	26	53.8	18	50.0
Female	52	50.0	15	53.3	17	64.7

*Data of anal swab undertaken on the first day among two successive examinations.

no remarkable differences in positive rate was observed. In rural community in Kangwon Do, the positive rate in earlier two decades showed much higher positive rate than in later life. And in rural community in Kyongsang Nam Do, positive rate in earlier two decades showed no remarkable differences. No remarkable differences according sex was also found in all of the communities.

The successive pattern of pinworm expulsion after the treatment with pyrantel pamoate was preliminarily traced in 20 children. The drug was administered at 20 : 00 the day before the beginning of collection of stool specimens. As shown in Table 2, the pattern of *E. vermicularis* expulsion was rapid. Total number of pinworms collected during three days period from 20 children was 181 and 2 children gave negative results in pinworm collection. 42.5% of pinworms were harvested in 12-hour stool and 55.7% of total were in 36-hour stool. Only 1.7% of pinworms were found in stool specimens collected after 48 hours.

From this results, the present authors decided to collect only two day stool specimens afterwards because the pinworms in the third day stool were collected from two persons who expelled already large numbers of pinworms in the first and second day and not influenced on the pinworm collection rate.

Table 2. Successive pattern of *E. vermicularis* expulsion after chemotherapy in 20 children

	1st day	2nd day	3rd day	Total
No. of collected pinworms	77	101	3	181
Per cent to total	42.5%	55.8%	1.7%	100%

As shown in Table 3, the pinworm collection rate and mean number of pinworm burden was variable with age. These two parameters were also high in 0—9 years than the later life and showed lower value with age. The mean numbers of collected pinworms were revealed consistently higher in female population in all three surveyed groups although the pinworm collection rates were variable by sex.

As shown in Table 4, the results from anal swabs revealed by far different compared with pinworm collection rates in all of the surveyed communities and differences between two parameters being 28.2%, 38.9% and 34.3% respectively. Though the positive rates of anal swab examination were very similar in all three communities, the latter two parameters showed remarkable differences being existed between orphanage institute and two rural communities.

Table 3. Age adjusted pinworm collection rate and mean number of collected pinworms in three communities

Age group (years)	Orphanage institute in Anyang City			Rural community in Kangwon Do			Rural community in Kyongsang Nam Do		
	No. exam.	Worm coll. rate	Mean No./pos.	No. exam.	Worm coll. rate	Mean No./pos.	No. exam.	Worm coll. rate	Mean No./pos.
0—9	9	100 %	11.6	14	100 %	57.4	24	91.7%	41.5
10—19	58	77.5%	9.1	7	85.7%	17.3	11	90.9%	7.7
20—29	—			4	100 %	6.0	—		
30—39	—			6	83.3%	16.6	—		
40 and over	—			8	87.5%	11.0	—		
Total	67	80.6%	9.9	39	92.5%	31.3	35	91.4%	30.9
Male	20	85.0%	6.5	20	95.2%	26.5	18	88.9%	29.6
Female	47	78.7%	11.4	19	89.5%	36.5	17	94.1%	32.3

Table 4. Comparison of three parameters of examinations in *E. vermicularis* infection

Surveyed communities	Positive rate of anal swab		Pinworm Collection rate		Mean number collected	
	No. exam.	Percent positive	No. exam.	Percent positive	No. per exam.	No. per posit.
Orphanage institute in Anyang City	82	52.4%	67	80.6%	8.2	9.9
Rural community in Kangwon Do	41	53.6%	39	92.5%	29.7	31.3
Rural community in Kyongsang Nam Do	35	57.1%	35	91.4%	28.3	30.9

The correspondence between two kinds of examinations were presented in Table 5. In orphanage institute, 88.6% out of 36 anal swab positive cases revealed to be pinworm collection positive. The remaining 11.4% gave negative results in pinworm collection after chemotherapy. Out of 32 anal swab negative cases, on the other hand, pinworms were collected in 23 cases and only 9 cases gave also negative results in pinworm collection. In rural community in Kangwon Do, 20 out of 22 anal swab positive cases revealed pinworm collection (90.9%) and remaining 2 cases gave negative results in pinworm collection after chemotherapy. Out of 17 anal swab negative cases of this community only one case did not give positive result in pinworm collection after chemotherapy and remaining 16 cases passed out some amount of

Table 5. Differences in pinworm collection rate and mean number of collected *E. vermicularis* in positive and negative groups of Scotch-tape anal swab examination in three surveyed communities

	Orphanage institute in Anyang City		Rural community in Kangwon Do		Rural community in Kyongsang Nam Do	
	A.s. *(+)	A.s. (−)	A.s. (+)	A.s. (−)	A.s. (+)	A.s. (−)
Number of subjects	35	32	22	17	20	15
Number of subjects pinworm collected (%)	31 (88.6%)	23 (71.9%)	20 (90.9%)	16 (94.1%)	19 (95.0%)	13 (86.7%)
Number of subjects pinworms not collected(%)	4 (11.4%)	9 (28.1%)	2 (9.1%)	1 (5.9%)	1 (5.0%)	2 (13.3%)
Mean number of pinworms per collected	12.8	5.8	50.3	9.4	42.1	14.6

* A.s.: Anal swab

pinworms after chemotherapy. In rural community in Kyongsang Nam Do, 19 of 20 anal swab positive cases revealed positive pinworm collection (95.0%) and only 1 remaining case gave negative result. Out of 15 anal swab negative cases 2 cases did not give positive results in pinworm collection after chemotherapy.

From the presented Table 5, it is recognized that the average number of collected pinworms from anal swab positive cases were by far greater than that of the negative cases in all of the surveyed communities. The mean number of collected pinworms from anal swab positive cases was 31.5 and that of negative cases was 9.1 if the data from three communities are amalgamated.

The distribution of cases with certain number of collected pinworms after chemotherapy were

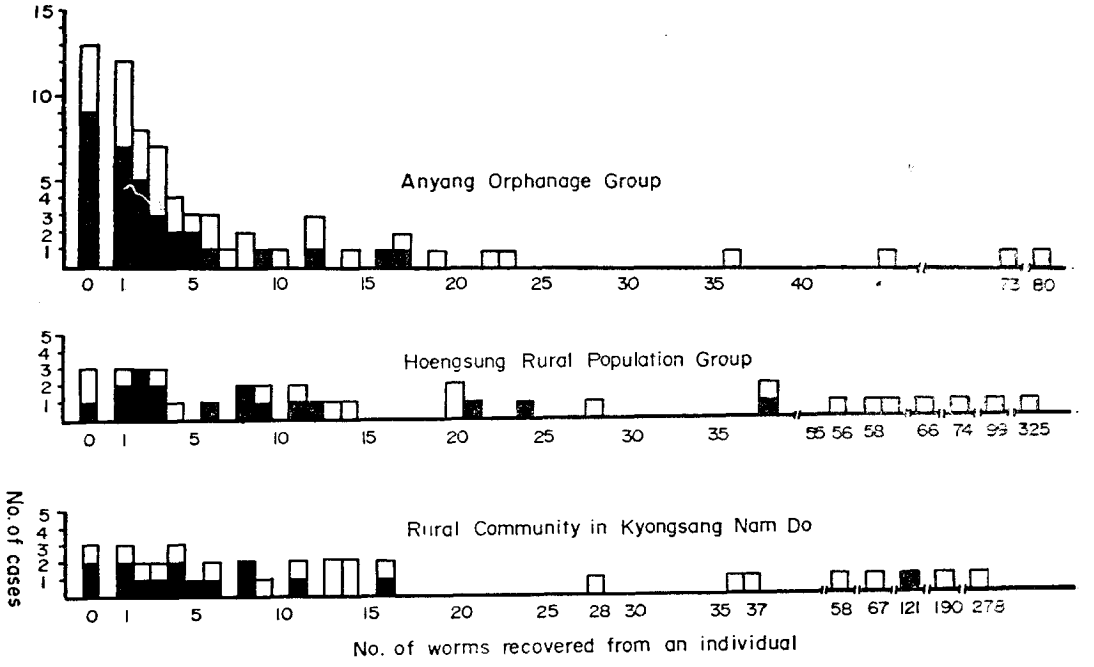

Fig. 1. Distribution of cases with certain number of pinworms collected after chemotherapy with pyrantel pamoate in three surveyed communities. The blackened portion in bar means the cases with negative anal swab results.

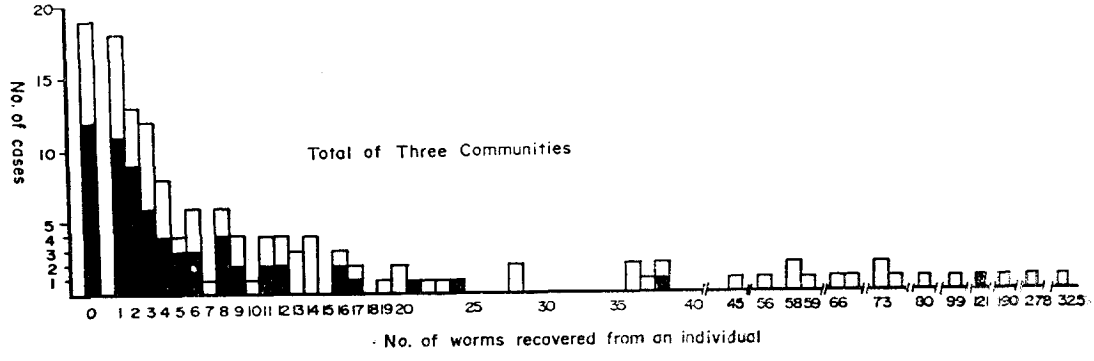

Fig. 2. Distribution of cases with certain number of pinworms collected after chemotherapy with pyrantel pamoate; amalgamation of data from three surveyed communities.

plotted and presented in Fig. 1 & 2. The general pattern of the distribution is skewed and so-called overdispersion in all of three communities surveyed, but more over dispersed in two rural populations. With rare exceptions, anal swab negative cases were distributed in lower worm burden less than 20, in all surveyed communities.

All of the collected pinworms were female except 2 male worms and the minimum size of collected female pinworm was 3.54mm in length.

2. Relations between bathing interval and positive conversion in anal swab examination: In the first trial of this study where the bathing facility was fairly good and functioning, the present authors instructed children to bath including careful washing of anal region in different days before the examination by anal swab.

The results of detection of *Enterobius* ova in different intervals between bathing and anal swab examination were presented in Table 6.

If an assumption that the eggs deposited by adult gravid *Enterobius vermicularis* remained on perianal skin for 2 days, is accepted, three cases detected one day after bathing means the appearance of pinworm during past 1 day. Among 6 cases who bathed 2 days before examination and gave positive results of anal swab, average 3 cases/day should be experienced the appearance through anus. On the same way among 15 cases, who bathed 3 days before examination, average 7.5 persons must be experienced pinworm appearance per day because the eggs deposited three days before were disappeared already by the assumption. The theoretical cumulative number of persons who experienced worm appearance per one day through anus will be 23.0 (28.0%) as presented in Table 6 in 2-day model.

In case of assumption that the eggs were remained for three days in anal region, the theoretical cumulative number per day in this observation must be 17.3 (21.1%), and in case of 4-days model, 16.8 (20.5%).

If those theoretical cumulative number of person per day were multiplied by respective assumptive days of egg detection, the positivity in this observed community will be 56.0%, 63.3% and 82.0% respectively as shown in Table 6.

It should be admitted that the eggs detected in perianal skin by anal swab were deposited by gravid *Enterobius* within 2 days because the

Table 6. Interval between bathing and positive conversion of anal swab examination in 43 (52.4%) of 82 children

Interval between bathing and anal swab	No. of subjects	No. positive	Presumptive No. of positive conversion/day in		
			2 days model*	3 days model	4 days model
One day	3	3	3	3	3
Two days	11	6	3	3	3
Three days	29	15	7.5	5	5
Four days	16	7	3.5	2.3	2.8
Five days	4	4	2	1.3	1
Six days	3	0	0	0	0
Seven days	16	8	4	2.7	2
Cumulative numbers of positive conversion/day			23.0	17.3	16.8
Presumptive swab positivity/day			(28.0%)	(21.1%)	(20.5%)
Presumptive swab positivity in community			56.0%	63.3%	82.0%

*A model that eggs deposited by female *Enterobius* remained on perianal skin for 2 days.

actual positivity in this community was 52.4% and most closely similar with the theoretical value obtained in 2-days model.

In Table 7, the number of eggs detected on single anal swab was presented by the interval between bathing and swab. The number of cases who gave worm of *Enterobius* or eggs more than 100 on Scotch-tape was 11 in this community.

Table 7. Interval between bathing and anal swab, and number of *Enterobius* eggs detected on single swab in orphanage institute

Interval btwn bathing and anal swab	No. of positive	No. of eggs detected on Scotch-tape
One day	3	60, 329, worm
Two days	6	14, 17, 28, 244, worm
Three days	15	1, 1, 1, 1, 1, 2, 3, 5, 11, 11, 13, 16, 19, 43, worm
Four days	7	2, 55, 71, 89, 102, 521, worm
Five days	4	3, 7, 15, 846
Six days	0	—
Seven days	8	1, 3, 7, 14, 23, 25, 127, worm

3. Successive examinations of anal swabs and calculation of positive rate proposed by Moriya: In the third trial of this study, 21 out of 35 children were examined successively two days. The obtained data was subjected to Moriya's modification of "Best asymtotically normal estimate" of Neyman and estimated the positive rate in this population. And the rate obtained by the model was compared with the results of pinworm collection. Two slides were prepared at each examinations of each individuals and two successive daily examinations were carried out. The results obtained were presented in Table 8.

From the presented results, "a" the positive rate in a population was calculated as 62.9% following the equation;

Table 8. Results of two successive daily examinations of anal swab in 21 rural children of Kyongsang Nam Do with comparison with the results of pinworm collection after chemotherapy

Results of first day anal swab	Result of second day anal swab	No. of cases	No. of positive pinworm coll.	No. worm collected from indiv.
+	+	10	9(90%)	0, 2, 3, 4, 9, 13 13, 14, 16, 58
+	−	1	1(100%)	36
−	+	2	2(100%)	4, 121
−	−	8	6(75%)	0, 0, 1, 4, 6, 8, 11, 16

$$a=\frac{(q_1+2q_2)^2}{4q_2}$$

where $q_1=\frac{N_1}{N}$ and $q_2=\frac{N_2}{N}$

and where N; Number of samples

N_1; Number of samples positive in two examinations

N_2; Number of samples positive in either one examination.

And "p", the probability of finding eggs in single slide was;

$$p=\frac{2q_2}{q_1+2q_2}=86.9\%$$

which means the false negative rate in this population by single slide is 13.1% by this observation.

In this group, however, showed 89.3% of positive pinworm collection rate in comparison with 62.9% of calculated positive rate.

DISCUSSION

If the prevalence rate of *Enterobius vermicularis* infection in a community is defined as "the proportion in a population who harboured *E. vermicularis* at a certain point of time," as presented in the introduction in this paper, the positive rate determined by single Scotch-tape anal swab is an useless tool in the estimation of pinworm prevalence.

The method used in this paper to determine

prevalence rate of *E. vermicularis* infection in a community, the treatment of all population with anthelminthics and collection of expelled pinworms should be the more accurate tool in the determination of prevalence rate. But some prerequisites of this methods include; 1) sufficient time to collect the expelled pinworms after chemotherapy, 2) efficacy of drugs used in the treatment which could act even on excysted larval stages of *E. vermicularis* and 3) collection methods of expelled pinworms present in stool specimens.

As for the efficacy of pyrantel pamoate, used in the treatment of surveyed population in this study, many authors have confirmed good and satisfactory results (Austin et al., 1966; Howes and Lynch, 1967; Bumbalo et al., 1969; Yokogawa et al., 1970; Rim et Lim, 1972). Kagei et Kihata(1971) reported that pyrantel did not show therapeutic action against larval worms of *Syphacia obvelata* at doses 50, 25, 12.5, and 6mg/kg body weight in mice. Yamamoto et al. (1971) agreed that pyrantel pamoate at the doses of 10mg/kg did not expell completely the immature and/or larvae of *E. vermicularis* by observation of the interval of positive conversion of anal swab after treatment.

In this connection, the results of worm collection showed that the minimum size of pinworms collected was 3.54mm in length and sexually mature although not fully gravid. This relative large size of collected worms must be related with the methods in collection, size of mesh pore and carefulness in detection of expelled pinworms. It seems that all of the expelled pinworms were not collected because of pore size and duration of collection undertaken in this study.

But the positivity in pinworm collection was by far the higher than that of Scotch-tape anal swab in all three surveyed communities.

A very similar study with this observation was already reported in Japan. Akagi (1953) recovered pinworms in 162 out of 196 cases of 15 years or more (82.6%) during postmortem examinations at the Tokyo Medical Examiner's Office. At the Kyoto Medical Examiner's Office, Kawamoto(1956) reported the infection rate of 81%.

The size and maturity of collected female worms and its relation with reinfection cycle of *Enterobius* infection must be considered. The collected pinworms after chemotherapy with pyrantel pamoate represented that they were in the developmental process of gravidation and expected to be discharged in forewarded 1—20 days period because it has been estimated that migration out of gravid female worms occurs from 15 to 43 days after the ingestion of infective stage pinworm eggs (Cram, 1943).

The causes of negative result in detection of ova of *E. vermicularis* by Scotch-tape anal swab could be classified as follows; first of all, no worms are present in intestine of individuals for sufficiently long period, secondly latent infection of larval or juvenile pinworms with remote history of anal appearance of gravid female worm and the third explanation, that continuous migration out of gravid female worms with some days interval during with eggs deposited were detachted already, and lastly poor technical manoeuvre which failed in detection of small number of eggs remained. In this study, only 18.7% of surveyed population was fall in the first category of above reasons and remaining 81.3% were in the second and/or third category of the reasons.

The causes of false positive results of anal swab with negative pinworm collection must be largely dependent upon the small size of worm burden of one brood of infection and/or long interval of reinfection broods. In this study, 9.1% of anal swab positive cases were in this category.

In this connection, if the collection methods are refined, thus even the smallest pinworm could be collected, the correspondence of anal swab positivity with pinworm collection rate will be elevated and vice versa.

The period of deposited eggs of *Enterobius vermicularis* detaching from the perianal skin has very important meaning in conferring significance of anal swab as an epidemiological tool. In this observation, the period was estimated as less than two days, by estimation of positive conversion of anal swab in different intervals of bathing and anal swab. If this data is accepted as reasonable the meaning of positive rate of single anal swab in a population could be defined as the incidence of appearance through anus of gravid female worms during past two days.

As fully accepted by many parasitologists, the limitation of Scotch-tape anal swab in diagnosis of pinworm infection is largely based on the principle that detect terminated parasitism(Faust et al., 1971; Akagi, 1973). To overcome this limitation especially as an epidemiological data, many workers recommended the repetition of anal swabs (Sadun et al., 1955, Moriya, 1956; Chyu et Lim, 1963; Akagi, 1973). But the number of repetition is rather controversial problem and generally 3-4 times were recommended by many authors.

Moriya(1956) modified the Neyman's "Best asymptotically normal estimate" and applied in estimating the positive rate of *Enterobius* infection. This modification has been accepted as good model in estimating the prevalence of pinworm infection of community. In this study, only two successive anal swabs were undertaken in the third trial group. And the estimation of positive rate by Moriya's modified formula was far from pinworm collection rate concomittantly undertaken in the same population. The present author would like the comparison of pinworm collection rate with repeated anal swabs undertaken more than 4 times in the future.

The distribution pattern of number of pinworms collected per individual was so-called skewed and over-dispersed in this study. This distribution was very similar with that presented by Li and Hsü(1951). The goodness-of-fit of this distribution with the theoretical value of negative binomial distribution of Bliss revealed not so significant in this observation. Considering the postulations proposed by Crofton(1971) on the fitness of negative binomial distribution in parasitic infections, the goodness-of-fit must be verified if the sample size is sufficiently large enough.

The data of anal swab in this study was in the range of 50—60% in all of three groups. Recent reports on the positive rate in Korean population made by various workers revealed the single anal swab positive rates over 40% (Seo et al., 1969; Choi et al., 1973; Kim, 1973; Rim et al., 1973; Park et al., 1974; Min et Hong, 1974; Ryang, 1975).

Seo et al. (1969) reported the positive rate of single anal swab in 8, 585 nationwidely collected specimens was as high as 46.6% and revealed the higher rates in rural children than urban population. Choi et al. (1973) surveyed 3,342 children in Taegu City and reported 42.6 % of positive rate by single anal swab. Park et al. (1974) in Choongpuk Province reported 41.9% on 858 children in church summer school by single anal swab.

It is considered that the data presented in this paper seems not so different from the general status of *Enterobius vermicularis* infection now in Korea.

SUMMARY

The significance of Scotch-tape anal swab technique was evaluated in three communities of Korea, one in orphanage institute and two in

rural populations, from November to December, 1975.

Based on the epidemiological concept that the prevalence rate of *Enterobius vermicularis* infection in a community as "the proportion in the population who harboured *E. vermicularis* at certain point of time", the present authors treated the whole surveyed population with pyrantel pamoate disregard to the results of Scotch-tape anal swab and collected pinworms expelled in stool specimens during 2 consecutive days after the chemotherapy.

Although the present authors could not collect the younger adult worms less than 3.54mm in length after chemotherapy, the positive rates of pinworm collection in three surveyed communities were 80.6%, 92.5% and 91.4% respectively whereas the positive rates of single Scotch-tape anal swab were 52.4%, 53.6% and 57.1% respectively. These results denote that results of single anal swab do not represent the prevalence rate of *Enterobius* infection in a community.

The results of successive two anal swabs and estimation of positivity in a population using Neyman's "Best asymptotically normal estimate" revealed 62.9% in the third trial group of this study and probability of finding eggs in single slide was 0.869. Comparing with the pinworm collection rate after the chemotherapy in this group the estimated positive rate was by far lower than that of pinworm collection(89.3 %).

The positive results of single anal swab did not correspond to the pinworm collection in average 9.1% of anal swab positive cases and the negative results did not correspond to pinworm collection in 81.3% of anal swab negative cases, when the data from three surveyed communities were amalgamated. These results must come from the principle of anal swab that detect the terminated parasitism.

With rare exceptions, the anal swab negative cases harbour relatively fewer number of *Enterobius* than those of positive cases. And the mean number of *E. vermicularis* collected from anal swab negative cases was 9.1 whereas the number in anal swab positive cases was 31.5.

By analyzing the data on the relationship between bathing interval and anal swab positive conversion, it was assumed that the positive rate of anal swab in a community represent the rate of appearance of gravid female *Enterobius vermicularis* through anus during approximately past two days prior to examination.

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=國文抄錄=

肛門周圍塗抹法에 依한 蟯蟲 感染 診斷의 意義에 對하여

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蟯蟲은 産卵方法이 다른 腸內線蟲類와는 달라서 雌蟲이 大腸을 거쳐 肛門, 直腸部位에서 産卵한다. 이러한 特徵 때문에 蟯蟲感染의 診斷에는 肛門周圍塗抹法이 利用되어왔다. 그러나 肛門에서 蟲卵이나 蟲體가 檢出되었을때에 그 檢出된 蟲卵을 排出한 蟲體는 이미 宿主腸內에는 存在하는 것이 아니기 때문에 肛門周圍塗抹法에서의 陽性이 곧 蟯蟲感染의 持續을 意味하는 證據로서 判斷하는데에 無理가 있다고 생각되어왔다.

著者 등은 "한集團에서 어떤 瞬間에 蟯蟲을 體內에 가지고 있는 宿主의 比率"을 有病率(Prevalence rate)로, "一定期間에 蟯蟲이 새로이 또는 또다시 感染되는 比率"을 發病率(Incidence rate)로 定義하는 疫學的 槪念을 導入하였을 경우 肛門周圍塗抹法의 成績이 이들 疫學的 槪念과 어떠한 關係에 있으며 檢査成績과 向後治療를 決定하는데 얼마나 信賴度가 있는가를 測定하고저 하였다.

安養市所在 1孤兒院의 院兒 82名과 江原道 橫城郡의 한 農村住民 41名 및 慶南 晋陽郡의 한 農村住民 35名을 對象으로 하여 從來의 肛門周圍塗抹法을 實施하여 本法에 依한 陽性率을 測定한 다음 그 結果에 關係없이 全對象者에게 Pyrantel pamoate를 10~12.5mg/kg의 容量으로 投藥하였다. 이후 排出되는 全大便을 2~3日間 蒐集한 다음 糞便과 섞여 排出된 蟯蟲을 蒐集하였다. 이 蟲體蒐集에서 陽性인 者의 比率을 蟯蟲의 그集團에서의 有病率로 하였고 蟯蟲有無와 肛門周圍塗抹法과의 相關關係를 分析하였다.

Pyrantel pamoate를 1回 投藥한 다음 排出되는 蟯蟲의 排出樣狀은 第1日에 42.5%, 第2日에 55.8% 및 第3日에 1.7%가 排出되었으며 그후에는 2日間의 糞便에서만 蟲體를 蒐集檢査하였다.

孤兒院院兒 82名에서 肛門周圍塗抹法 1回檢査의 陽性率은 52.4%이었는데 投藥後 蟲體를 排出한 被檢者는 80.6%이었고 被檢者 1人當 排出蟲體數는 7.9마리이었다.

江原道 住民 41名에서 肛門周圍塗抹法의 陽性率은 53.6%이었는데 排蟲者比率(=有病率)은 94.6%이었고 被檢者 1人當 排出蟲體數는 29.7마리이었다.

慶尙南道 住民 35名에서의 塗抹法 陽性率은 57.1%이었고 排蟲率은 51.4%이었고 平均 排蟲數는 28.3마리이었다. 이러한 結果는 肛門周圍塗抹法의 結果가 그 集團에 있어서 腸內에 蟯蟲이 寄生하고 있는 사람의 比率(有病率)을 代表하지 않는다는 것을 보여주고 있었다.

肛門周圍塗抹法의 成績과 排出蟲體 有無가 얼마나 一致하는가를 比較하였던바 孤兒院院兒群에서는 塗抹法 陽性者의 88.6%가 服藥後蟲體를 排出하였고 江原道 住民에서는 90.9%가, 慶南住民에서는 95.0%가 排出하고 있었다. 이러한 成績은 約 10%內外의 塗抹法 僞陽性이 있음을 보여주고 있는바 集團內에서 1마리의 感染負荷를 가지고 있는 사람의 比率과 關聯이 있는 것으로 생각되었다.

肛門周圍塗抹法의 結果가 陰性이었던 사람中에서 服藥後 蟲體를 排出한 사람은 孤兒院院兒에서 71.9%이었고 江原道住民에서는 94.1%, 慶南住民에서 86.7%로서, 이러한 塗抹法의 僞陰性의 比率은 그母集團의 平均感染負荷와 相關되는 것으로 생각되었다.

孤兒院院兒群에서 각각 다른 時差를 두고 沐浴을 시켜 塗抹法 陰性으로 한 다음 塗抹法을 實施하여 얻은 陽性率을 全體陽性率과 比較하여 보니 雌蟲이 産卵한 蟲卵은 肛門周圍에 約 2日後면 脫落되는 것으로 計算되어 한 集團에서의 肛門周圍塗抹法 陽性率은 그 集團에서 過去 2日間 肛門으로 蟯蟲이 出現한 者의 比率로 생각할 수 있었다.

慶南住民에서 連續 2回의 肛門周圍塗抹法을 實施하여 얻은 資料를 Moriya(1956)의 "Best asymptotically normal

estimate"法에 依하여 集團 陽性率로 換算하니 62.9%로 計算되었으며 그集團에서의 排蟲率 89.3%와 比較하여 隔差가 있었다.

以上의 結果로서 肛門周圍塗抹法의 蟯蟲蟲卵檢出率과 有病率로 假定한 排出蟯蟲陽性率과는 차이를 보이고 있었으며 肛門周圍塗抹法의 僞陽性率은 本調査群들에서 5~11%, 僞陰性率은 70~95%에 達함을 보이고 있었고 이것은 蟯蟲의 蟲體負荷의 分布와 有關한것으로 생각되었다.

大韓寄生蟲學會 紋章에 對하여

本學會의 紋章은 外緣으로부터 線蟲類의 斷面圖, 蠅蟲卵의 卵殼, 有鉤條蟲의 頭節, 그리고 4個의 吸盤에 파리의 頭部, 肺吸蟲의 被囊幼蟲, 四日熱原蟲의 成熟分裂體 및 실린더와 乳鉢을 表示하여 大韓寄生蟲 學會 會員들의 關心事인 原蟲. 線蟲, 條蟲, 昆蟲과 化學療法 등 各分野를 代表的으로 象徵하도록 圖案된 것입니다.

이 紋章은 서울大學校 醫科大學 寄生蟲學敎室의 主任敎授이며 1973年 11月 당시 제9代 大韓寄生蟲學會 會長이었던 徐丙禹 敎授가 本學會 및 그 活動을 象徵하는 紋章의 必要性을 考慮하여 圖案하신 것입니다. 이 紋章은 1973年 11月 22日 本學會 評議員會에 提出되어 公式的인 學會紋章으로 使用하기로 決議된 以來 使用되어 왔읍니다.

그 동안 이 紋章은 韓國寄生蟲에 關한 文獻目錄(1973)에 처음으로 使用된 以來 本學會 機關紙인 "기생충학잡지", 學術大會抄錄集 및 學會의 公式書類 등에 使用되어 왔읍니다.

現學會 任員陣은 이 紋章의 圖案을 使用하여 優雅한 文鎭을 만들어 그동안 學會基金 造成에 協助하여 주셨던 여러분께 贈呈할 豫定으로 있읍니다.(大韓寄生蟲學會學術部)