

Studies on Filariasis in Korea

—Status Survey and Chemotherapy in Cheju Do*—

Byong-Seol Seo M.D.

*Department of Parasitology and Institute of Endemic Diseases,
College of Medicine, Seoul National University*

Cheju Do has long been known as one of the most endemic areas of malayan filariasis in Korea through the various surveys for the past two decades (Bun, 1939; Hunter et al., 1944; Senoo et Lincicome, 1951; Lee, 1961; Lee et al., 1964). However, these surveys had been carried out in the restricted small areas, not covered all over the island.

Seo et al. (1965) examined the night blood specimens collected from 2,139 inhabitants who resided at 15 villages scattered all over the South and North Goon (County). And they reported the incidence varied with the villages examined, from 0.8 to 18.5 per cent of microfilaria positive rate. Another survey conducted by Seo et al. (1968) in six villages in Cheju Do, revealed 407 (17.6%) positive cases out of 2,308 persons examined. Kim (1973) also examined 2,970 blood specimens collected from 7 villages including four small islets and recorded the 17.4 per cent of microfilaria positive rate. There are other reports on the incidence of malayan filariasis in the villages, scattered in the island (Moon, 1970; Seo et al., 1974).

Meantime, many trials of treatment with diethylcarbamazine in the various dosage schedules have been attempted in different

villages by many workers during the past ten years. Particularly the provincial government of Cheju Do has been extending the mass-treatment in the villages designated according to the yearly plan of control programme under the supervision of health workers at County Health Centers.

Therefore, it is suggested to know the current epidemiological status in the island and to evaluate whether these attempts of mass-treatment, conducted rather randomly, were effective or not.

In this connection, the recent survey was performed for the comparison of the infection rates according to localities with those obtained in the previous surveys. On the other hand, considering the difficulties faced by the field workers for mass treatment, revised dosage schedule was urgently necessitated to achieve successful chemotherapeutic control. Therefore, the author tried to revise the low dosage schedule, previously reported (Seo et al., 1973) to lessen the occurrence of adverse reactions.

The present paper deals with the results of recent survey on the microfilaria rate of malayan filariasis in Cheju Do, in comparison with those of the previous reports summarized and also outlines the methods and results of a small trial of mass treatment with diethylcarbamazine in half conventional dose.

*This research was supported by the Grant, No. 65 in the year of 1975, from The Korean Traders Scholarship Foundation, Seoul, Korea.

<Received for Publication on April 2, 1976>

MATERIALS AND METHODS

Night blood survey for the detection of microfilaremia on which this report is based, was conducted during the years 1972 to 1975 in the areas of seven Myons (administrative unit under Goon) and two Eups (unit, smaller than City).

A total of 5,681 persons were subjected to the study of microfilaria positive rate, and the collections of a 30 cmm sample of ear-lobe blood, measured in a special pipette taken from each of these persons were made at night between 8.00 P.M. and midnight. Three stripe-smears were prepared on numbered slides, dried overnight, and the following morning they were stained in Giemsa solution after dehaemoglobinization in water and methanol fixation.

The average microfilaria density per cmm blood per positive case was also determined in some of the specimens collected.

A small village, Shinsan-Ri, Seongsan Myon, Cheju Do were selected for the study of treatment by diethylcarbamazine. Shinsan-Ri is located in eastern portion of South Cheju Goon with population of approximately 1,700 consisted of four Dongs (hamlet unit). The microfilaria survey was performed on the whole inhabitants and the collected data was analyzed in the epidemiological point of view.

Thirty-eight positive cases were subjected to a small trial of treatment, in which 3 mg diethylcarbamazine citrate (Supatonin, Tanabe Pharmaceutical Co.) per kg of body weight once daily for 12 doses, totaling 36 mg/kg has been employed as a chemotherapeutic course. Follow up study was made up to 250 days after treatment. The results obtained in the present study were compared with those

of other treatment schedules, such as conventional 6mg/kg dosage schedule and the low dosage schedule.

RESULTS AND DISCUSSION

Status survey: As shown in Table 1, the various reports on malayan filariasis in Cheju Do were summarized. It was suggested from the data in Table 1 and 2, that all of the people in the island are not evenly exposed to the filarial risk, and filariasis in South Goon is more endemic than in North Goon, except some of islets. And particularly in main island, the cases are more densely distributed in the villages near the coastal areas than the villages in hill side areas.

Since Senoo and Lincicome (1951) have reported the high incidence in Namwon and Pyosun Myons in South Goon, there are many reports to indicate the higher incidences in these areas (Lee, 1961 & 1964; Seo et al., 1965 & 1968; Moon, 1968; Kim, et al., 1973).

It is hardly to compare directly these figures on the microfilaria rates with the present data, because of the differences in the methods applied, sample size, localities examined and so on. However, as shown in Table 2 and Fig. 1, it is to be noted that the overall microfilaria rate and density have remarkably decreased within the past ten years. The rapid decrease both in microfilaria rate and density was recognized especially in the villages, such as Namwon and Pyosun, where mass treatment had been extensively conducted during the past five years by various workers (Seo et al., 1974; Kim, J.S. et al., 1973; Kim, B.C. et al., 1968 and County Health Centers).

Frequency distributions of microfilaria positives by age group were analyzed and compared among the data collected at 1965 survey and those of the present survey. As

Table 1. Summarized records of microfilarial surveys in Cheju Do

Observer and (Year published)	Surveyed areas		Subjects & Methods	Blood examination		Remarks
	Myon	Villages, Is.		No. of posit./ No. of exam(%)	Mf.D. /cmm.	
Senoo & Lincicome (1951)	Pyosun Namwon	Tosan, Sewha Wimi	Children & inhabitants, Qualitative	258/971 (26.6)	—	No mass treatment
Lee, K.T. (1961)	Pyosun Nam Choong- moon Chocheon	Sewha Taehung, Wimi Hayae	Children, Qualitative	26/229 (11.4)	—	No mass treatment
Lee, K.T. (1964)	Namwon	Shinhung, Shinchon Wimi	Inhabitants, Qualitative	79/356 (22.2)	—	No mass treatment
Seo et al.(1965)	Chuja	Whengan Is. Chuja Is.		18/ 95 (18.9) 2/104 (1.9)	4. 10 1.70	
	Aewol	Guom		10/ 63 (15.9)	2. 38	
	Hanlim	Kumlung		3/146 (2.1)	0. 40	
	Hankyong	Yongsu		2/201 (1.0)	2. 60	
	Anduk	Taepyung		12/150 (8.0)	1. 93	
	Choongmoon	Hayae		14/109 (12.8)	1. 43	
	Seogwi	Polmok	Inhabitants,	29/237 (12.2)	2. 90	
	Namwon	Wimi	Quantitative	19/112 (17.0)	5.23	No mass treatment
		Taehung		40/205 (19.5)	3. 63	
	Pyosun	Sewha		22/162 (13.6)	2. 98	
	Seongsan	Seongsan		7/201 (3.5)	0. 44	
	Kuja	Dongbock		3/174 (1.7)	0. 50	
	Chochun	Daehul		1/119 (0.8)	0. 30	
	Cheju City			1/61 (1.6)	0. 50	
	Total			183/2, 139 (8.6)	1. 91	
Seo et al.(1968)	Seogwi	Polmok		180/1, 332 (13.5)	1.70	
	Namwon	Sinyae-II Hayae	Inhabitants,	101/451 (22.3)	2.14	
		Namwon	Quantitative	24/ 51 (47.0)	2.12	Mass treatment applied
	Hanlim	Biyang Is. Hyopjae		9/ 78 (11.5)	3.43	
				57/195 (29.2)	3.80	
				36/201 (17.9)	2.60	
	Total			407/2, 308 (17.6)	2.63	
Moon, O.Y.(1968)	Pyosun	Tosan-II	Inhabitants,	99/366 (27.1)	2.40	Mass treatment applied
	Pyosun	Sewha-II	Quantitative	75/434 (17.3)	2.10	
	Namwon	Sinhung-I		56/307 (18.2)	2.70	
	Total			230/1, 107 (20.8)	2.40	
Kim et al.(1973)	Namwon	Taehung		136/460 (29.6)		
	Pyosun	Tosan		150/568 (26.4)		
	Choongmoon	Hayae		53/396 (13.4)		
	Hanlim	Biyang Is.	Inhabitants	75/242 (31.0)		Mass treatment applied
		Whengan Is.		42/155 (27.1)		
		Kapa Is.		58/1, 034 (5.6)		
		Mara Is.		3/155 (2.6)		
	Total			517/2, 970 (17.4)		
Seo et al.(1973)	Namwon	Wimi, Hayae, Shinyae	Inhabitants, Quantitative	273/1, 230 (22.2)	1.71	Mass treatment applied

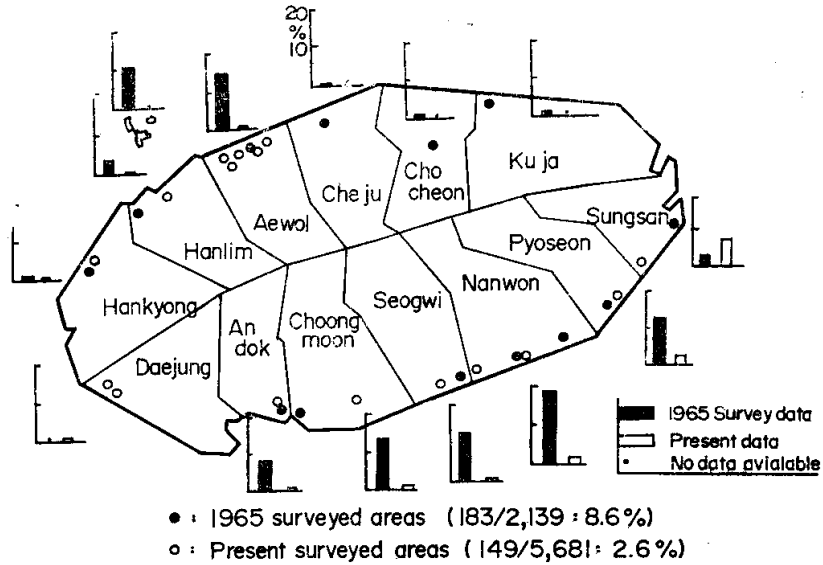


Fig. 1. Changes of the prevalence rates of malayan filariasis in Cheju Do for the past 10 years

Table 2. Microfilarial rates by localities according to two surveys in Cheju Do

Surveyed areas (Myon)	No. of posit./No. of exam.(%)		Mf. density/cmm	
	1965*	Present survey	1965*	Present survey
Aewol	10/ 63 (15.9)	3/593 (0.5)	2.38	0.73
Hanlim	3/146 (2.1)	2/436 (0.5)	0.40	0.08
Hankyong	2/201 (1.0)	0/123 (0)	2.60	0
Daejung	—	2/405 (0.5)	—	0.10
Anduk	12/150 (8.0)	10/513 (1.9)	1.93	—
Choongmoon	14/109 (12.8)	6/510 (1.2)	1.43	0.37
Seogwi	29/237 (12.2)	4/509 (0.8)	2.90	0.15
Namwon	59/317 (18.6)	34/1,507 (2.3)	4.15	1.20
Pyosun	22/162 (13.6)	2/101 (1.0)	2.98	0.77
Seongsan	7/201 (3.5)	86/984 (8.7)	0.44	1.70
Kuja	3/174 (1.7)	—	0.50	—
Chocheon	1/119 (0.8)	—	0.30	—
Cheju City	1/ 61 (1.6)	—	0.50	—
Whengan Is.	18/95 (18.9)	—	4.10	—
Chuja Is.	2/104 (1.9)	—	1.70	—
Total	183/2,139 (8.6)	149/5,681 (2.6)	1.91	1.40

*: Seo et al.(1965): Korean J. Parasit., 3(3) : 67-73.

Table 3. Frequency distribution of the microfilaria positives by age & sex according to two surveys in Cheju Do

Age	Data from	No. of Exam.			No. of positive			Percentages		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
0~4	I*	77	62	139	1	1	2	1.3	1.6	1.4
	II**	22	13	35	1	2	3	4.5	15.4	8.6
5~9	I	339	270	609	5	6	11	1.5	2.2	1.8
	II	146	67	213	10	6	16	6.8	9.0	7.5
10~14	I	1,104	789	1,893	18	13	31	1.6	1.6	1.6
	II	371	197	568	28	15	43	7.5	7.6	7.6
15~19	I	902	611	1,513	13	11	24	1.4	1.8	1.6
	II	299	138	437	21	16	37	7.0	11.5	8.4
20~29	I	198	201	399	11	9	20	5.6	4.5	5.0
	II	271	104	375	33	14	47	12.2	13.4	12.5
30~39	I	190	196	386	7	13	20	3.7	6.6	5.2
	II	140	75	215	4	7	11	2.9	9.3	5.1
40~49	I	119	217	336	10	12	22	8.4	5.5	6.6
	II	53	67	120	6	4	10	11.3	5.9	8.3
50~59	I	71	140	211	3	7	10	4.2	5.0	4.7
	II	40	69	109	5	2	7	12.5	2.8	6.5
60 over	I	54	141	195	4	5	9	7.4	3.5	4.6
	II	29	38	67	6	3	9	20.6	7.8	13.4
Total	I	3,054	2,627	5,681	72	77	149	2.4	2.9	2.6
	II	1,371	768	2,139	114	69	183	8.3	9.0	8.6

* I : The present survey.

** II : Seo et al. (1965): Korean J. Parasit., 3(3): 67-73.

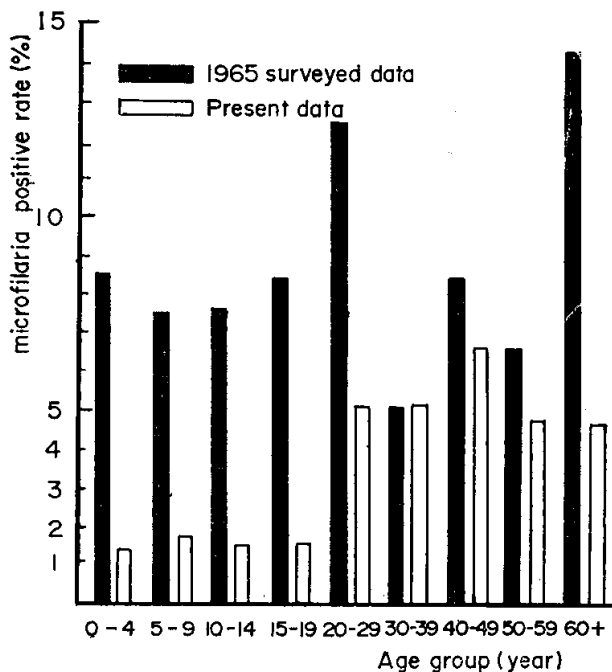


Fig 2. Histogram showing the positive rates of the microfilaria in Cheju Do for the past 10 years

indicated in Table 3 and Fig. 2, the infection rate in the present study showed rapid increase at the age of 20-29 years and reached to a peak of 6.6 per cent at the age of 40-49. Particularly the decreases of the infection rates were significantly marked among the younger age groups, especially in the age bracket, less than 30 years old within the past ten years.

The many observation on vector host reported by various investigators turned out that *Aedes togoi* plays the most important role in transmission of malayan filariasis in Cheju Island, although other species, *Culex pipiens pallens* may also contribute (Lee et al., 1964; Kim and Seo, 1968; Wada et al., 1971; Seo and Kang, 1973).

As presented in Table 4, the natural in-

fection rate of *A. togoi* in Wimi-Ri decreased distinctly from 8.8 per cent at 1970 (Wada et al., 1971) before treatment to 0.33 per cent in the present survey after four year mass treatment in this area. Chun (1968) reported the natural infection rate of *A. togoi* was 6.4 and 8.5 per cent in the area, Taehung and Biyang respectively. According to the observation made by Kim, J.S. et al. (1973), the infection rate before mass treatment in the three villages, Taehung, Tosan and Biyang were 7.1, 3.2 and 4.1 per cent respectively at 1967, however, these rates decreased up to zero per cent at the survey of 1970 after treatment.

From the results of the present survey all over the Island, Shinsan-Ri has turned out to be the highest in the positive rates of

Table 4. The rate of natural infection of *Aedes togoi*

Investigators (Year published)	Year of survey	Surveyed areas	No. of positive/ No. of dissected(%)	Remarks
Lee, K.T.(1964)	1960	Namwon, Wimi-II-Ri	2/464 (0.65)	
Chun, S.R.(1968)	1968	Namwon, Taehung	10/157 (6.4)	
		Choongmoon, Hayae	5/139 (3.6)	
		Biyang Is.	11/130 (8.5)	
		Kapa Is.	1/ 19 (5.2)	
Kim, et al.(1973)	1969	Namwon, Taehung**	9/127 (7.1)	* Treated in 1968.
		Pyosun, Tosan*	4/126 (3.2)	** Treated with Placebo
		Biyang Is.*	4/ 98 (4.1)	in 1968 and with DEC
		Hoengan Is.	6/ 78 (7.7)	in 1969.
		Kapa Is.**	1/ 67 (1.4)	
	1970	Namwon, Taehung	0/ 96 (0.0)	
		Pyosun, Tosan	0/ 64 (0.0)	
		Biyang Is.	0/ 30 (0.0)	
		Hoengan Is.	3/ 28 (10.7)	
		Kapa Is.	0/ 64 (0.0)	
Wada et al.(1971)	1970	Namwon, Wimi-I-Ri*	27/308 (8.8)	*Treated in 1970.
Present survey	1975	Namwon, Wimi-I-Ri	1/299 (0.33)	

Table 5. Frequency distribution of age prevalence of microfilaria in Shinsan Ri, Seongsan Myon, Cheju Do

Age group (years)	No. examined			No. of positive			Percentage		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0~4	25	15	40	1	1	2	4.0	6.5	5.0
5~9	99	74	173	4	4	8	4.0	5.4	4.6
10~14	112	91	203	11	7	18	9.8	7.7	8.9
15~19	39	38	77	3	4	7	7.7	10.5	9.1
20~29	51	55	106	7	3	10	13.7	5.5	9.4
30~39	57	57	114	4	10	14	7.0	17.5	12.3
40~49	34	70	104	8	6	14	23.5	8.6	13.5
50~59	28	48	76	2	4	6	7.1	8.3	7.9
60~69	26	39	65	2	3	5	7.7	7.7	7.7
70~	8	18	26	1	1	2	12.5	5.5	7.7
Total	479	505	984	43	43	86	9.0	8.5	8.7

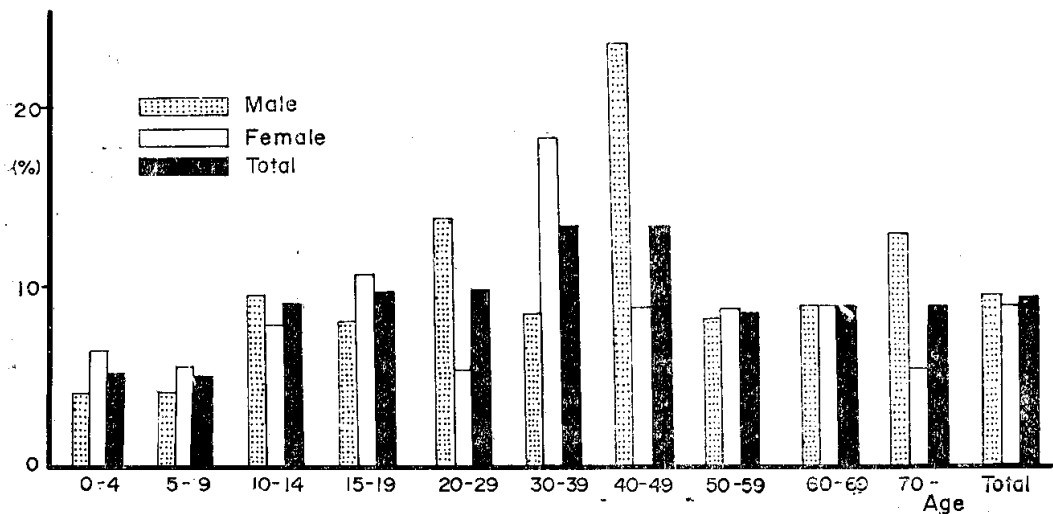


Fig 3. Histogram showing positive rate of microfilaria of filariasis in Shinsan Ri, Cheju Do

microfilaremia among the people examined, at where mass treatment has never been conducted before.

For the quantitative analysis of the positive cases, the frequency distribution of microfilaria positives by age and sex was tabulated in Table 5. Among 984 inhabitants examined, 86 (8.7%) were found infected. No sex difference was noticed, however, as shown in Fig. 3, all age groups were affected by

filariasis and distribution of positive cases showed the peak prevalence in 30-49 age bracket, thereafter the rates gradually decreased as age increased. In order to know the comparative level of the endemicity between the villages of Shinsan-Ri and Wimi-Ri in the previous survey (Seo et al., 1974), quantitative analysis on the microfilaria counts was attempted in these two areas, based on the fact that the regression line of the probit

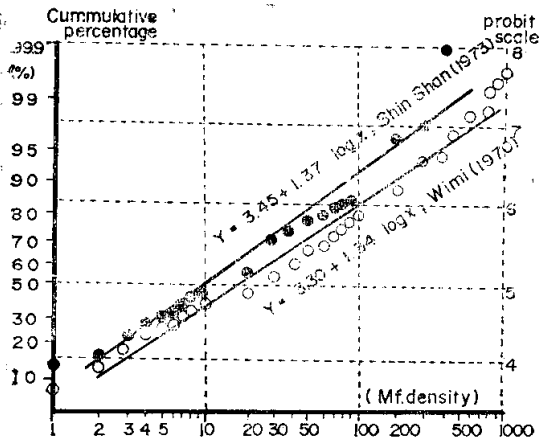


Fig. 4. Regression lines showing cumulative percentage of microfilaria positive cases by microfilaria density in two surveyed areas

values of cumulative percentage of the positives was almost linear against logarithms of microfilaria densities.

Seo and Whang (1974) has reported that the equation; $y = a + b \log X$ was represented as it follows, in case of Wimi-Ri at 1970 before the inauguration of mass treatment: $y = 3.30 + 1.34 \log X$ (1970).

On the other hand, the equation from Shinsan-Ri in the present study was, $y = 3.45 + 1.37 \log X$. As shown in Fig. 4, the comparison of these equations collected from the above two areas was made by two regression lines. It is indicated that the values of 'a' and 'b' in the regression equation in Shinsan-Ri were higher than those in Wimi-Ri. Therefore, the lower endemicity in Shinsan-Ri was confirmed.

Chemotherapy; It has been well known that the conventional chemotherapeutic course against bancroftian filariasis is consisted of daily dose of 6mg diethylcarbamazine per kg of body weight for 6 days, repeating with an interval of one or two months, totaling 72mg per kg as one course. There are many reports on the successful mass treatment of bancroftian

filariasis.

Seo and Whang (1974) reported that the chemotherapeutic control of malayan filariasis by the above conventional dosage schedule, applied in a village of Cheju Island for four year period has been successfully carried out and the quantitative level of endemicity in this area was distinctly lowered within four years of project period. Nevertheless, one of the most difficult problems that they have been experienced in the mass treatment by the above dosage schedule was the unexpected occurrence of fairly severe side effects, particularly febrile reaction followed the initial administration of the drug.

In this connection, Seo and Lee (1973) attempted to revise the method of administration of diethylcarbamazine to lessen the adverse reactions and to give the practicability of the drug in the use of mass treatment. According to them, the uninterrupted, successive daily dose of 0.5, 1, 2, 4, and 6 mg/kg of body weight with an additional 6 mg/kg once daily, totaling the maximum 37.5 mg/kg, could revert 35 out of 43 positive cases to the negative for 10 days after administration of drug. In other words, the negative conversion rate and microfilaria reduction rate in this low dosage schedule were 85.4 per cent and 99.5 per cent respectively. Comparing these results with those obtained in the conventional 6mg/kg schedule, they reported that the chemotherapeutic effectiveness of this low dosage schedule within shorter length of treatment was almost equal in terms of microfilaria negative conversion and reduction rates to the conventional larger dose. And particularly the resulting side reactions were also reduced in the low dosage schedule.

In spite of the improvement of treatment policy to lessen the side effects and shorten

the medication period, the divided small daily different doses from the initial 0.5 mg/kg dose followed by increasing doses seems not to be so practical for administering drugs because each patient should be given the drugs by home visit of field workers with adequate care at least nine days. Therefore, for the large scale mass treatment, it is considered impractical.

Simplification of medication was attempted in the present study to increase the practicality of the drug for mass treatment. As shown in Table 6, the daily 3mg/kg dose of diethylcarbamazine for 6 or 12 days, totaling 18mg or 36mg/kg, was chosen as a trial of treatment.

Thirty-eight out of 86 persons, who were found infected during the survey of Shinsan-Ri, were selected for this dosage schedule and the follow-up study was able to be made in only 15 cases up to 250 days after treatment. The negative conversion rates of microfilaria were fairly low as 55.3 per cent in case of total 18mg/kg administration, the quarter dose of the conventional schedule.

After initial dosage of 18 mg/kg, 15 cases were consecutively given 3 mg/kg dose for 6 days more and 12 out of 15 cases were found to be negative at the 250th day follow-up.

Therefore, in case of total 36 mg/kg schedule, the negative conversion rates increased to 86.7% at the 13th day follow-up examination. However, the reduction rate of microfilaria densities was remarkably high. Nine among 13 cases who received only the initial 18 mg/kg dosage became negatives, and three out of nine reverted to positive at 250th day after administration. On the other hand, among the cases given 36 mg/kg dose, only 2 cases reverted to positive at the 250th day after treatment. Consequently, on the 250th day after medication the follow-up studies of 12 among 15 cases given 36 mg/kg dose revealed 80.0 per cent in the rate of negative conversion and 99.4 per cent in the reduction rate of microfilaria density.

The above results were compared with those reported already by Seo and Lee (1973) in the low and conventional dosage schedules (Table 7).

Among these schedules, both the negative conversion rate and reduction rate were higher in low dosage treatment. Although half conventional treatment in this study showed the lowest in the negative conversion rate, the reduction rates among these dosages were almost the same. And the microfilaria density of the still positives observed in the present

Table 6. Results of half conventional schedule (3 mg/kg×12, total 36 mg/kg dose)

Treatment group	3 mg/kg×6	3 mg/kg×12
No. treated	38	15
Neg. conv. rate(%) follow-up at		
7th day	21/38 (55.3)	—
13th day	9/ 13 (69.2)	13/15 (86.7)
250th day	9/ 13 (69.2)	12/15 (80.0)
Total Mf. density/20 cmm		
pretreatment (ave.)	870 (66.9)	964 (64.3)
posttreatment (ave.)	20 (5.0)	6 (2.0)
Mf. reduction rate(%)	97.7	99.4

Table 7. Comparative results of the three dosage schedules

	Conventional treatment	Low dosage treatment	Half conventional treatment
Author (year)	Seo et Lee(1973)	Seo et Lee(1973)	The present study
No. of positive/ No. of exam.(%)	228/1,104 (22.7)	45/126 (35.7)	86/984 (8.7)
No. of persons with complete follow-up	141	41	15
Treatment duration (days)	12	9	12
Negative conv. rate (Follow-up day)	83.7% (180th day)	85.4% (10th day) 100% (150th day)	86.7% (13th day) 80.0% (250th day)
Total Mf. density/20 cmm			
Pretreatment (ave.)	11,136 (79.0)	2,907 (70.9)	964 (64.3)
Posttreatment (ave.)	109 (3.5)	14 (2.3)	6 (2.0)
Mf. reduction rate(%)	99.0	99.5	99.4

study was usually only 1 or 2 per 30 cmm of blood. The febrile reaction after initial administration of the drug has been observed in 68.4 per cent in this schedule, whereas it was 43.9 per cent in the low dosage schedule and 80.5 per cent in the conventional treatment.

From the analysis of the above results, it was suggested that the chemotherapeutic response to the treatment due to reduced doses showed in general almost equal effectiveness to remove microfilariae from blood with the less occurrence of side effects. Therefore, in order to void the severe adverse reactions and to expect fairly good rate of negative conversion of microfilaremia the low dosage schedule could be recommended in the treatment of cases with high microfilaria density. However, from the view points of practicability in the drug administration, the half conventional dosage may also be employed, particularly in the treatment of cases with low microfilaria density.

From the above observations, it may be concluded that the minimum total dosage required to remove the microfilariae from the blood in malayan filariasis appears to be 36 mg/kg of diethylcarbamazine.

SUMMARY

1. Based on the data collected through the night blood surveys during the period of 1972 to 1975 in Cheju Do, the present status of malayan filariasis in the island was analyzed, reviewed and compared with the results obtained in the previous survey during the past decade.

2. The present survey revealed that among 5,681 persons examined in the areas of seven Myons and two Eups, 149(2.6%) were found infected with *Brugia malayi*. And the mean microfilaria density was 1.40 per cmm of blood.

According to the geographic distribution by villages, the south-eastern portion showed a slightly higher rate of infection. From the distribution of the positives by age, the infection rate rapidly increased at the age of 20-29 years and reached to a peak of 6.6 per cent at the age of 40-49.

3. Compared to the present data with those collected from 1963 to 1964 by Seo et al.(1965), the overall infection rate distinctly decreased from 8.6 to 2.6 percent and the microfilaria

density also fell from 1.91 to 1.40 per cmm of blood. Especially, at certain villages in the south-eastern section of the island where mass treatment has been conducted, such as Namwon, Pyosun etc., the remarkable decreases in the rate of infection and microfilaria density have been recognized. This has been proved also in the decreased rates of natural infection of mosquito, *Aedes togoi* with mature larva of *B. malayi*. In the village of Namwon Myon, the natural infection rate of *A. togoi* decreased from 8.8 per cent at 1970 before mass treatment, up to 0.33 per cent at 1975 after treatment.

4. An attempt to revise the dosage schedule by diethylcarbamazine and to make the drug more practicable in the mass treatment was made. The half conventional dose, 3 mg/kg of diethylcarbamazine daily 12 times, totaling 36 mg/kg was chosen as a chemotherapeutic course.

The treatment response was analyzed on the basis of the negative conversion and reduction rates of microfilariae in the blood. Twenty-one out of 38 positive cases given the above doses were converted negative after the first 18 mg/kg doses at the seventh day of treatment. Twelve out of 15 cases who undertook the follow-up study up to 250th day after treatment were completely cleared from microfilariae in the blood by a total dosage of 36 mg/kg.

5. Three dosage schedules, the conventional dosage (6mg/kg daily, 12 times), the low dosage (0.5, 1, 2, 4, 6 mg/kg daily boosted 6 mg/kg up to four times) and the half conventional dosage (3 mg/kg daily, 12 times) were compared each other in their effectiveness. The negative conversion rate as well as the microfilaria reduction rate in the low dosage schedule was slightly higher than the others. However, it is assumed that the half conventional dose may also quite effective as

a smaller dose schedule.

It is practically recommended that the half conventional dose may also be employed in the mass treatment of the cases with low microfilaria density.

6. The minimum dosage to clear microfilariae of *B. malayi* from blood in Cheju Do seems to be good enough with the dose, of 36 mg/kg of diethylcarbamazine.

ACKNOWLEDGEMENT

Author was greatly indebted to Prof. S.H. Lee (College of Medicine, Chung-Ang Univ.), Dr. S.Y. Cho (College of Medicine, Seoul National Univ.) and Dr. S.Y. Kang (College of Medicine, Seoul National Univ.) for their sincere cooperation and earnest support which made this survey possible.

»國文抄錄«

韓國의 絲狀虫症에 관한 研究

—濟州道에 있어서의 現況調査 및 化學療法—

서울대학교 醫科大學 寄生虫學敎室 및 風土病研究所

徐 丙 高

우리나라의 風土病의 하나인 象皮病은 所謂 '수종다리'라 하여 오래 전부터 알려져 있었으나 尹日善(1927)은 扶餘出身의 男子 剖檢時에 左側 鼠蹊部 淋巴腺에서 最初로 糸狀虫 成虫을 檢出하고 우리나라에서의 地方性象皮病의 病因體를 糸狀虫일 것이라고 하였다. 吳漢永(1929)과 吳世南(1930)은 忠南等地에서 最初로 夜間 血液內 仔虫檢査를 實施하였다.

그후 많은 研究에 依하여 우리나라의 象皮病의 特性 및 그 分布 등이 밝혀졌다.

그러나 全國의 廣範圍한 分布 調査成績은 小數에 不 過하였다(Senoo et Lincicome, 1951; 徐 등, 1968). 특히

徐 등(1968)이 施行한 全國 30,534名의 夜間 檢血 成績에 依하면 우리나라의 糸狀虫(Filaria)種은 *Brugia malayi* 一種이며 比較的 큰 流行地로 慶尙北道 東北地方, 全羅南道 海岸 및 그 附近島嶼 및 濟州道를 指摘할 수 있다고 하였다. 특히 濟州道는 우리나라에서 가장 濃厚한 流行地를 形成하고 있다는 것이 많은 調査研究에 依하여 과거 數十年 사이에 밝혀졌다(文, 1939; Senoo et al., 1951; 李 등, 1964; 徐 등, 1965; 1968 및 1974; 金 등, 1973).

한편 많은 사람에 의하여 濟州道 馬來糸狀虫에 대하여 과거 十數年間 散發的으로 制限된 地域에서 集團治療가 實施된 바 있었다. 따라서 濟州道 馬來糸狀虫症의 疫學的 動態에도 상당한 變化가 豫測되므로 그간의 馬來糸狀虫症의 感染率 및 그 強度의 變化를 살피고 아울러 集團治療效果를 評價하기 위하여 現況調査를 企圖하였다. 동시에 가장 効率的인 治療法을 探究하기 위하여 慣例의 投藥量 半量에 의한 化學療法을 試圖하고 既存療法과 比較하였다.

本研究 結果를 綜合하면 다음과 같다.

1. 1972年에서 1975년까지 사이에 濟州道 全地域에서 實施한 夜間血液內 仔虫檢査成績을 토대로 濟州道 馬來糸狀虫症의 現況을 分析하고 十年前에 收集한 成績과 比較 檢討하였다.

2. 濟州道 七個面 및 二個邑에서 檢査한 5,681名中 陽性者는 149名으로 馬來糸狀虫 仔虫 陽性率은 2.6% 이었다. 單位 夜間血液內의 平均 仔虫濃度는 1.40 per cmm 이었다. 地域別 分布狀況을 보면 南郡 東南地域이 약간 높은 感染率을 나타내고 있었다.

年令別 分布狀況을 보면 20~29歲 年齡層에서 급격한 增加가 認定되며 40~49歲 年齡層에서 最高值 6.6%에 到達한다. 性別 差異는 뚜렷한 것이 없다.

3. 본 調査成績을 1963年에서 1964年 사이에 徐 등에 의하여 收集된 成績과 比較하였다. 感染率은 全般的(1965)으로 低下하여 8.6%(1965)에서 2.6%로 減小하였고 仔虫濃度도 1.91(1965)에서 1.40 per cmm으로 減小되었다. 특히 南郡 東南地域의 몇몇 部落(南元, 表善面)은 集團治療가 過去 數年間 實施되었던 곳으로 이 地域에서의 感染率 및 仔虫濃度는 현저히 減小되었음을 알 수 있었다.

4. 疫學的 變化樣相을 媒介 모기內 糸狀虫 幼虫 感染率을 基礎로 調査하였다. 특히 南元面 爲美里는 全住民에 대한 集中的 化學療法이 實施되었던 地域으로(徐 등, 1974) *Aedes togoi*內의 感染幼虫 檢出率은 8.8%(Wada et al., 1971)에서 0.33%로 현저히 低下되었

음을 알 수 있었다.

5. 集團治療時의 가장 큰 難點의 하나인 副作用, 특히 發熱등을 防止 또는 減小시키기 위하여 여러 化學療法 過程上의 變法이 講究되었으나 本研究에서는 投藥上의 便宜를 고려하고 每體重 kg當 3mg diethylcarbamazine을 每日 12回 繼續 投與하고 總量 36 mg/kg로 하는 所謂 慣例의 6 mg/kg의 半量療法을 試圖하였다. 治療效果는 仔虫陰轉率, 仔虫減小率을 基礎로 分析하였다. 3 mg/kg diethylcarbamazine 每日 6回投與한 후 第 7日째 檢査에서 38名중 21名이 仔虫陰轉하였다. 遠隔調査에 應한 15名중 12名은 12回 投藥후 第250日째 檢査에서 完全治療되었음을 알 수 있었다.

6. 本療法の 成績을 6 mg/kg씩 12회 投與하는 慣例의 療法과 0.5, 1, 2, 4, 6 mg/kg를 每日 投與하고 6mg/kg를 非陰轉者에게만 最大 4回 더 添加 投與하는 所謂 減量療法과 比較 分析하였던 바 後者에서 仔虫陰轉率 및 減小率이 높았다. 3 mg/kg씩 每日 12回 投與한 本療法은 仔虫陰轉率이 가장 低下되어 있었다. 그러나 所謂 減量療法에서는 劑量 分配投與와 管理에 人力이 많이 必要하여 集團治療에 實用性이 弱한 것을 參酌할 때 本療法도 仔虫濃度가 낮은 患者에게는 使用이 勸奨될만 한 것으로 생각되었다.

6. 위의 成績에서 미루어 볼 때 濟州道 馬來糸狀虫症 化學療法 管理에 必要한 diethylcarbamazine 最小 用量은 36 mg/kg로 足한 것으로 생각되었다.

REFERENCES

- Bun, J.C.: *The etiological investigation of endemic elephantiasis in Southern Korea I & II.* (in Japanese). *J. Chosen Med. Assoc.*, 29:553-575, 679-710, 1,426-1,442, 1939.
- Chun, S.R.: *A preliminary survey of mosquitoes of Cheju Do related to filariasis on species, biology and infection status* (in Korean). *Korean J. Publ. Hlth.*, 5(2):113-121, 1968.
- Hunter, et al.: *Parasitological studies in the Far East, epidemiological survey in South Korea.* *J. of Parasit.*, 35 (suppl.):41, 1949.
- Kim, B.C., Hahn, S.S., Seo, B.S., Rim, H.J., Ko, Y.H. and Lim, D.B.: *Mass treatment of malayan filariasis with diethylcarbamazine citrate in Cheju Do* (in Korean). *Korean J. Int. Med.*, 11(2):39-45, 1968.
- Kim, J.S., Lee, W.Y. and Chun, S.R.: *Ecology*

- of filariasis on Cheju Island (in English)*. *Korean J. Parasit.*, 11(1): 33-53, 1973.
- Kim, J.S., Moon, O.R., Lee, W.Y. and Chun, S.R.: *Efficacy of mass treatment for control of human filariasis. (in English)*. *Korean J. Parasit.*, 11(1):54-60, 1973.
- Kim, H.K. and Seo, B.S.: *Studies on filariasis in Korea. On the morphology and development of larvae of Brugia malayi in Aedes togoi (in Korean)*. *Korean J. Parasit.*, 6(1):1-16, 1968.
- Lee, K.T.: *Malayan filariasis. The 1st report. On incidences and distribution among children in Cheju Do (in English)*. *Bull. NIH. ROK.*, 4(1):107-111, 1961.
- Lee, K.T., Kim, S.H., Kang, J.H. and Song, J.S.: *Malayan filariasis. 2nd report. Epidemiological investigation on filariasis due to Brugia malayi in the residents of Southern Cheju Do Island (in Korean)*. *J. Korean Med. Assoc.*, 7:657-684, 1964.
- Oh, H.Y.: *Filariasis in Korea (in English)*, *China Med. J. XLIII. I 1929*.
- Oh, S.N.: *On the endemic elephantiasis in Korea (The First Report)*. (in Japanese), *Mansen no Ikai*, 111:1-9, 1930.
- Senoo, T. and Lincicome, D.R.: *Malayan filariasis. Incidences and distribution in southern Korea*. *U.S. Armed Forces Med. J.*, 2(10):1,483-1,489, 1951.
- Seo, B.S., Rim, H.J., Seong, S.H., Park, Y.H., Kim, B.C. and Lim, T.B.: *The epidemiological studies on the filariasis in Korea. I. Filariasis in Cheju Do (Quelpart island)*. (in Korean), *Korean J. Parasit.*, 3(3):139-145, 1965.
- Seo, B.S., Rim, H.J., Lim, Y.C. Kang, I.K. and Park, Y.O.: *The epidemiological studies in the filariasis in Korea. II. Distribution and prevalence of malayan filariasis in Southern Korea (in English)*. *Korean J. Parasit.*, 6(3): 132-141, 1968.
- Seo, B.S. and Kang, S.C.: *Experimental studies on susceptibility of Aedes togoi with Brugia malayi in Cheju-Island, Korea. (in English)*. *Seoul J. Med.*, 14(2):143-151, 1973.
- Seo, B.S. and Lee, J.W.: *Effectiveness of diethyl-carbamazine in the mass treatment of malayan filariasis with low dosage schedule (in English)*. *Korean J. Parasit.*, 11(2):1-9, 1973.
- Seo, B.S. and Whang, K.I.: *Evaluation of mass treatment of malayan filariasis by diethyl-carbamazine in Cheju Island (in English)*. *Korean J. Parasit.*, 12(1):21-32, 1974.
- Wada, Y., Katamine, D. and Oh, M.Y.: *Studies on malayan filariasis in Cheju Island, Korea. II. Vector mosquitoes of malayan filariasis. (Unpublished data from personal communication)*, 1971.