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- Contents -

Clonorchis sinensis in Taiwan

Forewords:

Clonorchis sinensis, or Oriental liver fluke, is prevalent in Japan, Korea, Vietnam, and Fukien, Canton and Taiwan provinces of China In Taiwan, it is more prevalent in the Hakka villages of Pintung County, Chi-shan and Mei-nung townships of Koahsiung County, Kuo-hsing and Pu-li townships of Nantou County, and Shi-tang, Ta-hu and Chuo-lang townships of Miaoli County The disease seems to be related to the habit of eating raw fishes (sasimi) and other raw foods Surveys of intestinal parasites among 1 8 million school children by the Parasite Association of the Republic of China found 1,657 cases in 1978, 2,038 in 1979, 2,209 in 1980, and 994 in 1981 The infection rate in the endemic areas in Taiwan is estimated to be between 10 and 59%

Survey of Intermediate Hosts:

About 35 types of fresh-water snails are found to be the first intermediate host for Clonorchis sinensis They include snails such as: B longicornis, Parafossarulus manchouricus, Parafossarulus atriatulus

Fresh-water carps (Cyprinidae) are the major second intermediate host There are 30 some types of them throughout the Taiwan Area including such as: Zacco platypus, Zacco platypus, Rhodeus ocellatus, Carrasius auratus, Aristichthys nobilitis, Ctenopharyngodon idellus The infection rates for Ctenopharyngodon idellus, Pseudorasbora parva, Tilapia mossambica are found by past surveys to be between 1 and 90%

From the 575 fish specimens collected by the Institute from 29 townships in 10 cities and counties between June and December 1986, 6,566 encysted larvae (including some larvae of other Trematodiasis) have been identified, averaging 11 4 encysted larvae per fish For instance, from the 9 Zacco platypus, 559 encysted larvae, and from the 13 Zacco platypus, both collected in Chia-hsien township, 5,040 larvae have been identified; from the 5 Carrasius auratus collected in Chi-shan, 282 larvae, and from the 28 Rasborinus fukiensis collected in Shuei-li, 269 larvae have been identified (see Table 1)

Between February 1987 and December 1989, from the 689 fresh-water fishes collected in 36 townships of 10 cities and counties, 22,031 encysted larvae of Clonorchis sinensis (including some larvae of other Trematodiasis) have been identified, averaging 31 97 larvae per fish For instance, from the 17 Carrasius auratus collected in Shi-ting and Ping-lin, 397 encysted larvae, from the 27 Carrasius auratus collected in Kuo-hsin and Lu-ku, 235 larvae, and from the 22 Carrasius auratus collected in Shi-tan and Ta-hu, 3,730 larvae have been identified Zacco platypus in 34 areas surveyed are found to be highly infected The number of larvae in each fish ranges from 2 to 750 Fishes found in Lu-ku township of Nantou County have the highest average number of larvae at 750, fishes of Shi-tan township of Miaoli County at 366, and fishes of Tung-shan township of Ilan County at 130. Rhodeus ocellatus in 6 areas survey are found infected with 1 to 26 larvae per fish Carrasius auratus in 5 areas out of 13 surveyed are found infected Rasborinus fukiensis in Yu-chi and Pu-li townships of Nantou County are also infected (972 larvae in 22 fishes, averaging 44 18 per fish) Ctenopharyngodon idellus, Aristichthys nobilitis, Tilapia mossambica, however, are not infected (see Table 2) Survey findings show that Clonorchis sinensis is widely distributed throughout the Taiwan Area Areas that are found uninfected may be so just because they are not yet discovered More surveys are needed

Study of Cases:

A survey of the infection status of the general public in Kuo-hsing Township of Nantou County and Shi-tan Township of Miaoli County was conducted by the Institute between Aguust and November 1989 The general findings are as follows:

Fecal specimens of 800 residents of Chang-liu, Chang-fen, and Chu-mu villages of the above-mentioned townships have been tested with hydrochloric acid, sodium sulfate, and Tritone sedimentation (AMS III method) to find 102 persons infected with Clonorchis sinensis eggs, at an average infection rate of 12 75% The infection rates range from the highest 21 29% in Chu-mu village, 10 55% in Chang-liu village, to 9 28% in Chang-fen village (see Table 3). The infection rates by age are: 38 24% for persons above 60 years of age, 22 55% for persons in the 50-50 age group, 18 63 for the 40-49 age group, 14 71 for the 30-39 age group, 2 94 for the 20-29 age group, 1 96 for persons under 10 years of age, and 0 98 for the 10-19 age group (see Table 4) The survey result shows that these are the most highly infected areas More surveys are needed to find out if the neighboring areas with similar food habits are also infected The infection rate is higher in male (65 68%) than in female (34 31%), and increases with age

Conclusion:

The present survey covers a small part of Taiwan Area More areas will be surveyed in the future For the prevention, the public should be discouraged from eating raw fresh-water fishes No toilet should be built on fish ponds, and fishes should not be fed with human or animal wastes Once identified, cases should be treated with medicines to avoid further infection Local health workers should give more attention to the prevention of this inffection

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Table 1. Survey of the Second Intermediate Host for Clonorchis sinensis

Location		Fresh-Water Fish																				Remarks
County	Township	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	
Miaoli	Nanchuan	7	(−)		3	(−)																	June 1986
	Sanwan	10	(−)																				June 1986
	Chaochiau	6	(−)		7	(−)																	June 1986
	Shitan																						June 1986
Hsinchu	Chutung	10	1	0.10																			June 1986
	Chienshi	8	(−)		4	(−)																	June 1986
	Wufeng																						June 1986
Nantou	Puli	10	4	0.40	10	(−)					3	(−)											July 1986
	Kuohsing	10	6	0.60	7	(−)	0.38										8	(−)					July 1986
	Shueili	7	8	1.15	8	3											2	(−)		28	269	9.61	July 1986
	Yuchi	10	(−)																				July 1986
Taoyuan	Lungtan	37	(−)											1	(−)								August 1986
	Tahsi	46	(−)											1	(−)								August 1986
Hsinchu	Kuanhsi	30	11	0.37	2	2	1																August 1986
Taoyuan	Yangmei	40	(−)																				August 1986
Ilan	Sanhsing	45	118	2.63																			August 1986
	Lotung	23	(−)		8	(−)																	August 1986
Tai-chung	Tachia				20	12	0.60																September 1986
	Taan	25	56	2.24	2	2	1																September 1986
	Tungshi	15	(−)		13	5	0.39																September 1986
	Wufeng	25	109	4.36																			September 1986
Chiayi	Putze													2	(−)		5	(−)					November 1986
	Chuchi																5	(−)					November 1986
	Putai													3	(−)								November 1986
Kao-hsiung	Liukwei	11	27	2.46	13	15	1.16				5	28	5.6										December 1986
	Meinung	6	7	1.1	7	10	1.4																December 1986
	Chishan																						December 1986
	Chiahsien	9	550	61.12	13	5040	387.7										5	282	56.40				December 1986
	Taoyuan																						December 1986
Total		390	892	2.30	117	5089	43.49				8	28	3.50	7	(−)		25	282	22.28	28	269	9.60	

Notes: 1. (1) – No. of fishes examined; (2) – No. of encysted larvae; (3) – Average no. of encysted larvae per fish.
2. For large fishes such as Aristichthys nobilitis, Ctenopharyngodon idellus, a portion of the meat is tested; for small fishes, the centire fish is used for testing.

Table 2. Survey of the Second Intermediate Host for Clonorchis sinensis

Location		Fresh-Water Fish																				Remarks
County	Township	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	
Taipei	Shenkeng	20	6	0.30	14	(−)																	February 1987
	Shihing	14	282	20.1	7	1065	150																February 1987
	Pinglin				10	2921	292.1	5	79	15.8													February 1987
	Shuanhsi	11	152	13.81				6	109	18.2													February 1987
Tainan	Kuantzelin	15	16	1.1				8	41	5.1													March 1987
	Wushantou										1	(−)											March 1987
	Hsinying							5	23	4.6							5	(−)					March 1987
Pin-tung	Sitsunghsi	38	68	1.78																			March 1987
	Santimei	5	21	4.20													3	2	0.66				March 1987
	Hengchung																						March 1987
	Wanruan	14	34	31.0																			March 1987
	Pingtung																6	(−)					March 1987
	Neipu	5	9	1.80				40	30	0.75													March 1987
	Chauchou																6	2	0.33				March 1987
Ilan	Tungshan	24	3137	130.7	1	47	470										5	68	13.6				April 1987
	Yuanshan	7	548	78.2																			April 1987
	Ilan																7	140	20.6				April 1987
Hua-lien	Jueishuei																10	(−)					April 1987
Tai-tung	Chipen																2	(−)					April 1987
	Taitung																10	(−)					April 1987
Nantou	Yuchi																			12	955	79.58	September 1988
	Wushe	19	149	7.84																			September 1988
	Puli	15	58*	3.87	7	17*	2.43																September 1988
	Chushan	6	49*	8.17			120										2	371	181.5				September 1988
	Luku	23	1447	62.91	1	120*											30	56*	1.87				September 1988
	Mingchien	5	102	20.40																			September 1988
Ping-tung	Chauchou										8	(−)											February 1989
	Checheng	62	(−)								2	(−)											February 1989
	Santi	16	(−)																				February 1989
Kao-hsiung	Liukwei	10	(−)																				February 1989
	Chiahsian	15	(−)																				February 1989
Nantou	Kuohsing	20	258	12.9	15	200	133							1	(−)								February 1989
	Luku	2	1500	750	12	35	2.92																February 1989
	Yuchi													5	(−)					10	17	1.70	October 1989
	Puli													14	(−)								October 1989
Miaoli	Shitang	10	3665	366.5	7	3650	521.4																October 1989
	Sanwang	19	425*	22.37			4	105	2425														October 1989
	Tahu	15	124	8.27	15	53	3.53																November 1989
	Cholang	13	(−)		12	(−)																	November 1989
Taichung	Tungshi																			8	(−)		December 1989
Total		403	12050	29.90	101	7983	79.04	68	387	5.69	1	(−)					86	639	7 43	22	972	44.18	December 1989

Notes: *Metarchis SP

1. (1) - No. of fishes examined; (2) - No. of encysted larvae; (3) - Average no. of encysted larvae per fish.
2. For large fishes such as Aristichthys nobilitis, Ctenopharyngodon idellus, a portion of the meat is tested; for small fishes, the entire fish is used for testing.

Table 3. Survey of Clonorchis sinensis Infection in Nantou and Miaoli Counties, August-November 1989

County	Township	Village	No. examined	No. positive	% positive
Nantou	Kuohsing	Changliu	275	29	10.55
Nantou	Kuohsing	Changfeng	323	30	9.28
Miaoli	Shitan	Chumu	202	43	21.29
Total			800	102	12.75

Table 4. Clonorchis sinensis Infection Rate by Age and Sex, Nantou and Miaoli Counties, August-November 1989

Location	No. positive	Sex	Age						
			−10	10-19	20-29	30-39	40-49	50-59	60+
Changliu, Nantou	29	M(20)	1(3.45)	0	0	3(10.33)	3(10.35)	3(10.35)	10(34.48)
		F(9)	0	0	0	0	4(13.79)	2(6.89)	3(10.35)
Changfeng, Nantou	30	M(19)	1(3.33)	0	1(3.33)	3(10.00)	3(10.00)	5(16.67)	6(20.00)
		F(11)	0	1(3.33)	0	3(10.00)	3(10.00)	1(3.33)	3(10.00)
Chumu, Miaoli	43	M(28)	0	0	2(4.65)	5(11.63)	5(11.63)	7(16.28)	9(20.93)
		F(15)	0	0	0	1(2.33)	1(2.33)	5(11.63)	8(18.60)
Total	102	M(67)	2(1.96)	0	3(2.94)	11(10.78)	11(10.78)	15(14.71)	25(24.51)
		F(35)	0	1(0.98)	0	4(3.92)	8(7.84)	8(7.84)	14(13.73)
	102		2(1.96)	1(0.98)	3(2.94)	15(14.71)	19(18.63)	23(22.55)	39(38.24)

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1. Kim, DC and Kunz, RE: Epidemiology and Helminth Diseases: Clonorchis sinensis (Cobbold, 1875) Looss, 1907 on Taiwan (Formosa), C.M.J. 11: 29-47, 1964