

Epidemiology Bulletin

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Sero-Epidemiological Survey of *Entamoeba Histolytica* in Lanyu Township, Taitung County

1. Introduction

Lanyu (the Orchid Island) is an off-shore island 45 nautical miles to the east of Taitung with a population of 3,018 persons and a land area of 48 square kilometers. With the exception of a few government employees and businessmen, the population are primarily of the Yami-tribe. Of the adult population, a third are without regular income, 43.4% with a monthly income of more than NT\$5,000. 30.2% of them are medically insured, 55.6% with public water supply, and only 29% of the households with private toilets. The only health station provides modern medical care for the entire island. Life on Lanyu is closed and self-sufficient, and isolated from the Taiwan proper. Generally speaking, both the economic and health conditions are poor, with low rate of medical insurance and limited medical care resources⁽¹⁾.

The distribution of *Entamoeba histolytica* is world-wide. Estimates are that about 500 million people world-wide are infected, with an infection rate between 8 to 10%. Of those infected, 94% are in the tropical and sub-tropical developing countries in Asia, Africa and Latin America⁽²⁾. The infection rate of the general population in Taiwan in 1961 was 4.01%⁽³⁾; in 1990, study by the authors of some military draftees (aged around 20 years) with the Indirect Hemagglutination (IHA) method gave a positive rate of 0.8%⁽⁴⁾. By comparing the two findings, the status of amebic dysentery infection in Taiwan seems to have improved. However, Lanyu island, with relatively difficult living conditions, requires further attention, and this study thus was conducted.

2. Method and Materials

Sample blood survey of the 3,000 some residents of Lanyu was conducted in May 1993 with the assistance of the Lanyu Health Station. The target population was set at about one-sixth of the 3,018 total population, or around 500 persons. There are five villages: Yehyou, Langtao, Tungching, Yehyin and Hungtou. Workers visited families at random to collect blood specimens. The blood was centrifugated, sera collected, frozen and then sent back to the National Institute of Preventive Medicine of the Department

of Health for laboratory testing with IHA method. A positive case was defined as one with the officially recognized titer of 256 times. The microtiter of each batch was 96 persons, comparing at the same time with both negative and positive antigens to control the accuracy. The IHA kit used was of Behring, Germany.

3. Findings

Some residents refused to be taken blood, blood specimens were collected from 425 persons (14% of the total population), slightly fewer than the target of 17% (one-sixth of the population). Blood collection rates differed from villages, ranging from 6 to 60% (see Table 1). 181 persons had an amebic serum antibody titer at 256 (positive) or higher, giving a positive rate of 42.58%. Positive rates by villages ranged from 35.04% (Yehyou village) to 60.00% (Yehyin village).

Of those tested, 204 were male with a positive rate of 38.72%; 221 were female, with a higher positive rate than male of 46.15% (see Table 2). By age, of the 10 boys and 4 girls in the 1-4 age group tested, all were negative. Of the 15 men aged 70 years and above tested, 14 (93.33%) were positive; and of the 13 women in the same age group tested, 8 (61.54%) were positive. Both sexes combined, of the 28 persons tested in this age group, 22 (78.57%) were positive, giving the highest positive rate of all age groups. From age group 15-19 years and on, age-specific infection rates were all higher than the average of 42.58% for the entire township, and the rate increased with age.

4. Discussion

Since the development by Diamond in 1960-1970 of exenic cultivation method for *Entamoeba histolytica*⁽⁵⁾, many sero-diagnostic methods have been developed, making available more alternatives to the traditional microscopic examination of feces in the diagnosis and epidemiological studies of this protozoa. The IHA method used in the present survey is as good as the other serum methods such as the GDP (Gel Diffusion Precipitin), LA (Latex Agglutination), IFA (Indirect Immunofluorescence), CIEP (Countercurrent Electrophoresis), and ELISA (Enzyme-linked Immunosorbent Assay) in detecting at 91% positive rate of confirmed amebic liver abscess patients, and 83-98% of amoebic dysentery patients (with the exception of IFA and CIEP methods)⁽⁶⁾. The detection rate of asymptomatic cyst carrier, however, is not satisfactory. While ELISA method can give a positive rate of 77%, GDP and IHA are less effective at about 50%, and lower for other methods. For mass examination or epidemiological surveys in which a large amount of specimens are involved the simplicity and quickness of IHA make it an ideal method. US CDC also uses this method frequently for supplementary diagnosis and epidemiological studies⁽⁷⁾. On the other hand, some experts maintain that serological method is not of value in the study of this disease in epidemic areas on two grounds: antibody titer in blood of IFA and IHA infected persons can last for several years; the positive detection rate of amebic dysentery patients is around 19-50%, and that for asymptomatic cyst carrier is only around 5-54%⁽⁸⁾. The opinions about this method

are varied. While both fecal examination and sero-testing are of low reliability, it is difficult to decide on which method to use and the findings are hard to interpret and compare. The present survey, for difficulty in communication with the local residents, random sampling method was not used, instead, families were visited and blood specimens collected only from persons who were more cooperative, with a target of one-sixth of the total village population. The total number tested was 425 persons (see Table 1), which was 14% of the total 3,018 population, fewer than the targeted 17% of the population. However, the 42.58% positive rate for the entire township obtained in the survey is a rate rarely seen in all similar studies, and by comparing with findings in the last 20 years, is one of the highest⁽⁹⁾. Positive rates in all five villages were high, ranging from 35.04% (Yehyou village) to 60.00% (Yehyin village). This indicates that infection in the township was universal and not sporadic, though this point requires further studies for verification. Effective preventive measures should, therefore, be taken to protect the health of the residents. By age (see Table 2), of the 14 children in age group 1-4 years tested, none was positive. The highest positive rate appeared in age group 70 years and above, of the 28 tested, 22 were positive, giving a positive rate of 78.57%. Generally speaking, the positive rates started with 21.95% (20/91) for children in the 5-9 age group and increased with age, reaching a highest for age group 70 years and above. This is different from the age distribution of positive rates in the non-epidemic areas. Tissue-invasive amebas attack young adults more, and are less seen in children younger than 5 years old⁽¹⁰⁾. The authors do not have any reasonable interpretation for this difference. The positive rate of 46.15% for female was higher than the 38.72% of the male. This, again, is different from other studies and requires further studies for clarification.

For serologically positive cases, the use of ultrasound is most applicable in detecting any liver abscess⁽¹¹⁾. Microscopic testing of trophozoite in feces is of not much value in the diagnosis of either liver abscess or tissue-invasive amebiasis. Jackson⁽¹²⁾ tried IgM antibody immunofluorescence method to differentiate acute and past infections. The findings were that IgM antibody positive disappeared in one year. Even comparing simultaneously with the above-mentioned immuno-diagnostic method in detecting the existence of IgG, it still is difficult to tell whether it is a current or past infection. This is one breakthrough that serological diagnostic methods have to make.

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References:

1. Wu PF. A study of medical care seeking behavior of the Yami on Botel Tobago. Assay for master degree, School of Public Health, National Taiwan University 1993.
2. Guerrant RL. The global problem of amebiasis: Current status, research needs and opportunities for progress. *Reviews of Infectious Diseases* 1986; 8: 218-227.
3. Hsu TC. Parasitic Diseases. *Taiwan's Health* 1963; 58-64.
4. Chou CH, Lee SY, Liu KH, et al. An epidemiological study of Amebiasis in Taiwan area. *Chinese J Microbiol.* (Presentation in 24th Annual Meeting), 1990; p.66.
5. Diamond LS, Harlow DR, Cunnick CC. A new medium for the axenic cultivation of *Entamoeba histolytica* and other *Entameba*. *Trans R Soc Trop Med Hyg* 1978; 72: 431-432.
6. Takeuchi T. Serologic diagnosis of Amebiasis. *Examination and Technology (in gapomese)* 1990; 18: 965-970.
7. Healy GR. Immunologic tools in the diagnosis of Amebiasis: Epidemiology in the United States. *Reviews of Infectious Diseases* 1986; 8: 239-246.
8. Feigin RD. *Textbook of pediatric infections diseases*. 3rd ed 1992; 2006-2007, W.B. Sanders Company.
9. Walsh JA. Problems in recognition and diagnosis of Amebiasis: Estimation of the global magnitude of morbidity and mortality 1986; 8: 228-237.
10. Benenson AS. *Control of communicable diseases in man* 1990 (15th edition).
11. Jien LN, Liao YH, Chen TL. Amoebic liver abscess. *Medicine Today (in Chinese)* 1993; 20: 473-477.
12. Jackson TFHG. Serological differentiation between past and present infection in hepatic Amebiasis. *Trans R Soc Trop Med Hyg* 1984; 78: 342-351.

Table 1. Findings by IHA for *Entamoeba Histolytica* in Residents of Lanyu Township by Village

Village	Population	No. Tested	Rate (%)	Positive	Rate (%)
Yehyou	625	113	18	40	35.04
Langtau	537	76	14	30	39.47
Tungching	918	55	6	29	52.73
Yehyin	101	60	60	36	60.00
Hungtou	837	121	14	46	38.02
Total	3,018	425	14	181	42.58

Table 2. Findings by Age and Sex

Age	Male			Female			Total		
	No. Tested	No. (+)	%	No. Tested	No. (+)	%	No. Tested	No (+)	%
1-4	10	0	0.00	4	0	0.00	14	0	0.00
5-9	45	13	28.89	46	7	15.22	91	20	21.98
10-14	44	12	27.27	26	10	38.46	70	22	31.43
15-19	7	4	57.14	2	0	0.00	9	4	44.44
20-29	11	5	45.45	17	7	41.18	28	12	42.86
30-39	24	9	37.50	61	33	54.10	85	42	49.42
40-49	19	7	36.84	23	15	65.22	42	22	52.38
50-59	13	7	53.85	14	12	85.71	27	19	70.37
60-69	16	8	50.00	15	10	66.67	31	18	58.06
70+	15	14	93.33	13	5	61.54	28	22	78.57
Total	204	79	38.72	221	102	46.15	425	181	42.57