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INCIDENCE OF ANTIBODIES AGAINST HUMAN IMMUNODEFICIENCY VIRUS, HUMAN T-CELL LYMPHOTROPIC VIRUS TYPE 1, HEPATITIS B VIRUS, HEMORRHAGIC FEVER WITH RENAL SYNDROME VIRUS AND CHLAMYDIA IN TONGA AND WESTERN SAMOA

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SUMMARY: Among the populations of Tonga and Western Samoa, serum antibodies against human immunodeficiency virus or hemorrhagic fever with renal syndrome virus were not detected (0/904 and 0/192). No serum samples were considered to be positive for antibody against human T-cell lymphotropic virus type 1 (0/527). Hepatitis B antigen and antibody were found in 4% (8/192) and 47% (90/192), respectively. *Chlamydia trachomatis* IgG and *C. psittaci* IgG antibodies were detected in 39% (75/192) and 47% (91/192), respectively. The possibilities of the spread of human immunodeficiency virus and hemorrhagic fever with renal syndrome virus on the islands when the viruses invade from abroad were discussed.

INTRODUCTION

Western Samoa and the Kingdom of Tonga are parts of the South Pacific Islands. These islands were thought to be untouched by a new viral disease, such

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as human immunodeficiency virus (HIV) infection, because of being isolated from other countries. Today, we cannot deny the invasion of HIV infection in these countries through foreign tourists and repatriates.

In mid-1987, a Tongan national returned from the United States with AIDS and was nursed in a hospital in Tonga until his death a short time later (1). We had an opportunity to visit these countries as consultants for WHO's Special Programme on AIDS. Our project was to work with the governments of these countries to formulate a short-term plan for AIDS prevention and control.

During our visits, we were able to obtain blood samples. We examined these samples for not only antibodies against HIV and human T-cell lymphotropic virus type 1 (HTLV-1) but also those against hepatitis B virus surface (HBs) antigen, *Chlamydia trachomatis* and *C. psittaci*, and hemorrhagic fever with renal syndrome virus (HFRSV). We examined also for HBs antigen. Here we report the results of our examinations and discuss prevention of the infection on the Islands.

MATERIALS AND METHODS

Sera: Seven hundred and twelve Tongan adult sera were collected at health centers in 1985 in the field study of hepatitis B. One hundred and ninety-two Western Samoan sera were obtained from adolescents (10-20 years old) and adults who visited the National Hospital in 1988. The sera were randomly collected from the clinics.

Studies were carried out mainly on Western Samoan sera because the volume of samples from Tonga was not sufficient for all the examinations.

HIV antibody: Enzyme immunoassay (EIA) test kits (2) from Abbott company were used for the Tongan sera following the manufacturer's instruction. The gelatin particle agglutination (PA) test with the kit from Fuji Rebio Inc. was conducted on Western Samoan sera following the manufacturer's instruction (3). Fluorescence antibody (FA) method and western blot (WB) analysis were conducted as in the previous reports (4,5). Persistently HIV-1-infected MOLT4/KB-1 cells propagated in our laboratory were used as FA and WB virus antigens.

HTLV-1 antibody: The PA test kit from Fuji Rebio was used for screening of the HTLV-1 antibody (6). Persistenty HTLV-1-infected MT1 and TCL-Kan cells

were used for the FA method and WB analysis, respectively, with affinity-purified peroxidase-conjugated goat anti-human IgG (Pel Freeze Co., Rogers, AR) (5,7) for the confirmatory test. Samples with both *gag* and *env* proteins detectable by WB were considered to be HTLV-1-antibody positive. Those with only *gag* protein detectable as equivocal, while those with neither *gag* nor *env* protein as HTLV-1-antibody negative. The samples positive by both FA and WB were considered to be indisputably positive for HTLV-1 antibody.

HBs antigen and HBs antibody: HBs antigen and HBs antibody test kits were kindly given to us by the Institute of Immunology Co. Ltd., Tokyo, Japan. The passive hemagglutination test for HBs antibody and the reverse passive hemagglutination test for HBs antigen (8) were conducted following the manufacturer's instruction (9).

Antibodies against C. trachomatis *and* C. psittaci: IgG and IgA antibodies against *C. trachomatis* and *C. psittaci* were examined by the microplate FA method provided by the Denkaseiken Co. Ltd., Tokyo, Japan (10).

HFRSV antibody: HFRSV IgG antibody was detected by the FA method with HFRSV (SR-11 strain)-infected Vero E6 cells (11).

RESULTS

HIV Antibody

The seven hundred and twelve Tongan sera were all HIV negative by enzyme immunoassay. The one hundred and ninety-two Western Samoan sera were all negative by PA.

HTLV-1 Antibody

Eleven (3.3%) of the 335 Tongan sera and five (2.6%) of the 192 Western Samoan sera were positive by PA. HTLV-1 antibody titers in positive sera were between 256 and 16 (Table I). Positive sera by PA were further examined by FA and WB. All 16 sera were negative by FA, while one serum was negative by WB. The other 15 sera showed an equivocal result by WB (Table II). We concluded all sera were HTLV-1 negative.

Table I. Incidence and titers of anti-HTLV-1 antibody in Tonga and Western Samoa

	Total samples	Positive samples	Samples with titers of				
			16	32	64	128	256
Tonga	335	11 (3.3%)	5	3	2	0	1
Western Samoa	192	5 (2.6%)	4	1	0	0	0

Table II. Results of confirming tests of anti-HIV-1 antibody in Tonga and Western Samoa

	Positive samples by PA	Method	Results
Tonga	11	FA	all negative
		WB	negative 1
			equivocal 10
Western Samoa	5	FA	all negative
		WB	all negative

PA: Particle agglutination, FA: Fluorescence antibody
WB: Western blot

HBs Antigen and HBs Antibody

Eight (4%) of the 192 Western Samoan sera and 90 (47%) of the 192 sera were HBs antibody positive. HBs antigen positive titers were between 128 and 4, and HBs antibody positive titers were between 16,384 and 4 (Table III).

Antibodies against C. trachomatis *and* C. psittaci

Chlamydia trachomatis IgG antibody was positive in 75 (39%) of 192, and *C. trachomatis* IgA antibody was positive in 25 (13%) of 192. *Chlamydia psittaci* IgG antibody was positive in 91 (47%) of 192, and *C. psittaci* IgA antibody was positive in 14 (7%) of 192 sera (Table IV).

Table III. Incidence and titers of HBs antigen and HBs antibody in Tonga and Western Samoa

	TS	PS	Samples with titers of									
			4	8	16	32	64	128	256	512	2048	16384
HBs antigen	192	8(4%)	5			1	1	1				
HBs antibody	192	90(47%)	22	14	13	12	8	9	6	3	1	2

TS: Total samples, PS: Positive samples

Table IV. Incidence of *Chlamydia trachomatis* and *Chlamydia psittaci* in Western Samoa

	Total samples	IgG positive	IgA positive
C. trachomatis	192	75 (39%)	25 (13%)
C. psittaci	192	91 (47%)	14 (7%)

HFRSV Antibody

HFRSV IgG antibody was not detected in the 192 Western Samoan sera by FA.

DISCUSSION

WHO's October 1988 report showed that AIDS patients in Oceania numbered 1,024 in Australia, 1 in French Polynesia, 89 in New Zealand, 4 in Papua New Guinea, 1 in Tonga, none in Cook Islands, none in Fiji, none in Kiribati, none in Mariana Islands, none in New Caledonia and Dependencies, none in Samoa, none in Tuvalu and none in Vanuatu (12). Our small-scale

seroepidemiological study showed that Tonga and Western Samoa are not extensively infested by AIDS.

Several test kits for HTLV-1 are commercially available. False positives are frequently reported with the test kits (13,14) and use of more than two different tests is recommended to confirm the diagnosis. We, therefore, tried to confirm the results of PA by FA and WB. Fifteen positive results by PA were all negative by FA. Although 10 Tongan samples showed equivocal results by WB, we interpreted that they were negative for HTLV-1 antibody from the results by FA. Striking differences in incidences of antibodies to HTLV-1 among populations of the Southwestern Pacific were noted by ELISA (15). We need to use such other techniques as polymerase chain reaction to confirm the results more accurately.

HBs antigen and HBs antibody were detected in 4% and 47% respectively in our examinations. The incidence of HBs antigen was reported to be 18% in Papua New Guinea, 16% in the Philippines, 4.7% in Kenya, 12% in Solomon Islands, 18% in Wuvula Island, 2.7% in Japan and 0.5% in Australia. The incidence of HBs antibody was 28% in India, 42% in Thailand, 17% in Japan and 3% in Australia (16). Our data indicate that HBV infection is one of public health problems on South Pacific Islands.

Chlamydia trachomatis infection causes pneumonia, conjunctivitis, sexually transmitted diseases and so on in adults and infants (17,18). Almost half of the Samoan sera had positive IgG antibody to both *C. trachomatis* and *C. psittaci*. About 10% of the sera showed IgA antibody, which means active infection (19). In our experiments, quantitations of IgA and IgG antibodies were not done for either *C. trachomatis* or *C. psittaci*, but our data indicate a high incidence of chlamydial infection in the South Pacific Islands.

Sexually transmitted diseases, including *C. trachomatis*, frequently precede to HIV infection (20). Our data suggest that, if HIV infection invades these islands, it may spread readily among the people.

HFRS is a serious infection in the northern parts of Asia and Europe. It is estimated that 500 to 1,000 cases occur annually in the Soviet Union and in the Republic of Korea. Mortality by the Far Eastern type of HFRSV has decreased from 10 to 15% to around 5% (21,22). This is due primarily to improved managements of patients and supportive cares and to the introduction of renal dialysis. Antibodies against HFRSV were detected in humans and urban rats in the Americas (Alaska, Argentina, Brazil, Canada, Columbia, United States, including Hawaii), in the Western Pacific and Southeast Asia (Burma, Fiji, Hong

Kong, India, Malaysia, Sri Lanka, Singapore, New Guinea, Philippines, Taiwan, Thailand), as well as in Africa (Central African Republic, Egypt, Gabon, Nigeria, Sudan, Madagascar, Uganda) where HFRS is not known to exist (23).

According to our results, there were no antibodies against HFRS viruses in Tonga or Western Samoa. We need to continue the test because HFRS antibody was found in Fiji near Tonga. It will also be important to protect the South Pacific Islands from invasion of the HFRS virus as well as HIV.

Age- and sex-specific incidences of serum antibodies against HIV, HTLV-1, HBV, HFRSV and Chlamydia were not determined in our study of adolescents and adults. We will examine infants and children in the future.

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