

THE USE OF TRAVEL VACCINES BY JAPANESE EXPATRIATES IN DEVELOPING COUNTRIES

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Abstract: From 1998 to 2001, using questionnaires, we surveyed the use of travel vaccines among Japanese expatriates in developing countries. The percentage of those using more than one type of travel vaccine before departure increased significantly (45.6% in 1998 to 53.4% in 2001 ($p < 0.001$)). In regions such as tropical Africa and South Asia, vaccination rates were high. But the increase was most noticeable in East Asia, the Middle East, and Latin America. Vaccinations against hepatitis A, hepatitis B, and tetanus were high throughout the developing countries. Vaccinations against yellow fever and Japanese encephalitis were high in endemic regions. Vaccination rates were slightly higher for typhoid fever in South Asia and tropical Africa than that in other areas. Vaccination rates for cholera, however, showed yearly declines. These trends seem to reflect a growing awareness among expatriates of the benefits of travel vaccines. Even so, nearly half of those living the countries have not received sufficient vaccination, indicating a need for further education.

INTRODUCTION

Global business has resulted in an increase in the number of Japanese living abroad long-term. According to statistics from the Ministry of Foreign Affairs, the number of Japanese expatriates in 2002 was 590,000 people, approximately three times as many as in 1980. Of these, about 200,000 people live in developing countries, and are at risk of various local infectious diseases [1].

In order to lower the risk of infectious diseases overseas, travel vaccine can be administered. However, vaccination rates tend to be low among Japanese expatriates. Ac-

cording to research by Basnyat from 1997 to 1998 in Katmandu, 95% of Japanese travelers were not vaccinated against hepatitis A or typhoid fever [2]. Among non-Japanese people, 90% had been vaccinated against these diseases. Therefore, we developed a questionnaire-based investigation to further clarify the situation.

METHODS

Each year, we perform a health consultation service for Japanese expatriates residing in urban areas of developing countries. The subjects of this survey were Japanese expa-

Table 1. Number of Japanese who responded to the questionnaire each year

Area	Countries	1998	1999	2000	2001
Total		3061	2895	2982	2755
East Asia	China	591	490	466	382
South East Asia	Indonesia, Malaysia, Myanmar Philippines, Thailand, Vietnam	917	823	958	878
South Asia	Bangladesh, India, Nepal, Pakistan Sri Lanka	496	513	521	442
The Middle East	Bahrain, Egypt, Iran, Morocco, Oman Qatar, Saudi Arabia, Turkey, UAE	539	549	530	587
Tropical Africa	Ethiopia, Ghana, Ivory Coast, Kenya Nigeria, Tanzania	196	170	146	180
Latin America	Colombia, Costa Rica, Ecuador Guatemala, Mexico. Puerto Rico Panama, Venezuela	322	350	361	286

triatees who responded to the consultation from 1998 to 2001. The research was limited to those 16 years of age or older. Many of the subjects were employees sent from Japanese companies, and their families.

From 1998 to 2001, during the consultation, questionnaires were given to the subjects. On the questionnaire, the travel vaccines were listed, and the subjects were requested to note the vaccines they had received before departure. Table 1 shows the number of responses corresponding to the year they were received.

The list contained the following 10 vaccines: hepatitis A, hepatitis B, tetanus, rabies, yellow fever, Japanese encephalitis, cholera, typhoid fever, and meningococcal meningitis.

We used the chi-square method to analyze the data.

RESULTS

(1) Total vaccination rate

Table 2 shows the percentage of respondents who received one or more types of travel vaccine before departure. The vaccination rate elevated from 45.6% in 1998 to 53.4% by 2001. The value in 2001 is significantly higher than that in 1998 ($p < 0.001$).

On a regional basis, in 1998, the vaccination rates in tropical Africa and South Asia were high and did not vary much during the period of this survey. On the other hand, in East Asia and the Middle East, the vaccination rate in

1998 was only about 30%. The subsequent years showed dramatic increases, and by 2001 both regions showed rates higher than 45%. In Latin America, the rate also rose from 44.7% in 1998 to 56.6% by 2001.

(2) Individual vaccines' vaccination rate

The vaccination rates of individual vaccines excluding cholera and meningococcal meningitis showed an increase from 1998 to 2001 (Table 3). In 2001, the rate for hepatitis A was the highest at 40.3%, hepatitis B and tetanus were in the 30% range, followed by rabies at 18.2%. The rate for cholera decreased, coming to 2.1% in 2001, and that for meningococcal meningitis did not change during the period.

All regions showed increases in rates for hepatitis A, hepatitis B, tetanus, and rabies (Table 4). In 2001, the rate for hepatitis A in tropical Africa was highest at 53.9% and lowest in the Middle East at 30.0%. The rate for hepatitis B was highest in tropical Africa at 50.6%, lowest in the Middle East at 22.7%. The rate for tetanus was highest in South Asia at 54.8% and lowest in East Asia at 22.5%. Rabies was highest in South Asia at 37.3% and lowest in East Asia at 3.9%.

For yellow fever, vaccination rates in endemic regions such as tropical Africa and Latin America were high. In tropical Africa, rates increased only slightly: from 79.1% in 1998 to 81.1% in 2001. In Latin America, rates increased more dramatically: from 15.2% in 1998 to 25.9% in 2001.

Vaccination rates were high for Japanese encephalitis

Table 2. Japanese who received one or more types of travel vaccine (1998 to 2001)

	1998 (%)	1999 (%)	2000 (%)	2001 (%)	P value (1998 vs 2001)
Total	45.6	48.3	49.2	53.4	<0.001
By area					
East Asia	31.6	34.5	35.2	46.6	<0.001
South East Asia	45.6	43.6	43.2	47.8	not significant
South Asia	64.9	67.1	66.0	65.6	not significant
The Middle East	28.9	37.0	40.8	45.0	<0.001
Tropical Africa	86.7	90.0	91.8	86.7	not significant
Latin America	44.7	48.6	54.0	56.6	<0.05

Table 3. Japanese who received travel vaccines (1998 to 2001)

	1998 (%)	1999 (%)	2000 (%)	2001 (%)	P value (1998 vs 2001)
Hepatitis A	31.0	35.0	36.3	40.3	<0.001
Hepatitis B	24.9	28.3	29.3	34.4	<0.001
Tetanus	29.8	34.1	33.9	38.0	<0.001
Rabies	11.9	16.5	16.5	18.2	<0.001
Yellow fever	7.7	7.9	8.4	9.5	<0.05
Japanese encephalitis	5.4	8.9	9.1	10.5	<0.001
Cholera	4.6	3.4	2.7	2.1	<0.001
Typhoid fever	0.9	1.5	2.4	3.6	<0.001
Meningococcal meningitis	2.0	1.2	1.1	1.9	not significant

Table 4. Comparison of vaccine type received by area in 1998 and 2001

		East Asia	South East Asia	South Asia	The Middle East	Tropical Africa	Latin America
Hepatitis A	1998	21.5	32.0	47.8	19.7	46.9	30.4
	2001	40.1***	37.2*	52.9	30.0***	53.9	42.7***
Hepatitis B	1998	17.1	29.3	37.1	12.2	40.8	18.9
	2001	32.5***	32.7	43.4*	22.7***	50.6	26.2*
Tetanus	1998	12.9	26.2	52.0	21.2	57.7	34.5
	2001	22.5***	33.1*	54.8	34.2***	54.4	44.8**
Rabies	1998	2.7	8.4	29.6	4.5	34.2	9.9
	2001	3.9	15.9***	37.3*	10.9***	35.6	18.9**
Yellow fever	1998	0.0	0.3	1.8	3.7	79.1	15.2
	2001	0.0	0.2	3.2	4.4	81.1	25.9**
Japanese encephalitis	1998	4.4	7.5	11.9	0.9	1.0	0.9
	2001	8.9*	14.2***	26.5***	1.0	1.1	1.4
Cholera	1998	2.9	5.6	5.6	1.3	14.8	2.5
	2001	1.0	2.5***	3.2	1.0	4.4***	1.7
Typhoid fever	1998	0.2	0.3	2.8	0.0	4.6	0.3
	2001	0.8	1.0	10.9***	0.9*	16.7***	1.0
Meningococcal meningitis	1998	0.2	0.1	0.6	1.3	25.0	0.3
	2001	0.0	0.0	0.7	2.2	20.6	0.0

P value of 1998 vs 2001: * < 0.05 ** < 0.01 *** < 0.001

in endemic regions such as East Asia, Southeast Asia, and South Asia. In these three areas, the rates showed significant increases from 1998 to 2001.

Vaccination rates for typhoid fever in 1998 were low in all areas, although 2001 saw slight increases to 16.7% in tropical Africa and 10.9% in South Asia. Vaccination rates for meningococcal meningitis were very low everywhere except for tropical Africa. Even in that region, there was no major change from 1998 to 2001.

In all regions, the vaccination rates for cholera decreased during the periods of this survey.

DISCUSSION

Infectious diseases are a major health issue for overseas tourists and expatriates in developing countries. For example, Steffen estimated that the infection rate for hepatitis A is 0.2% for people residing in a developing country for a month [1]. In an investigation by Ohara using members of Japan Overseas Cooperation Volunteers as subjects, the disease rate for 1 year reached 3.9% in 1979 [3]. In a subsequent investigation using the same subjects in 1980, the rate for hepatitis B was 1.09% per year. There have been no cases of rabies among Japanese expatriates since 1970. However, according to an investigation by Takayama, from 1990 to 1996, the number of subjects who visited a metropolitan hospital for post-exposure vaccination of rabies rose to 93 cases [4]. According to a report by the National Institute of Infectious Diseases, 44 cases of typhoid fever and 25 cases of cholera were reported in 2000. There have been no

reports of yellow fever among Japanese travelers, but there have been cases among European and American travelers in endemic regions [5].

Travel vaccines are regarded as an effective means of preventing these diseases [6]. For travelers to developing countries, vaccination for hepatitis A, hepatitis B, tetanus, rabies, and typhoid fever are strongly recommended. Also, vaccinations are recommended for yellow fever in tropical Africa and South America and for Japanese encephalitis in Asia.

Since we know that the vaccination rate for Japanese travelers is extremely low [2], we conducted this survey on Japanese expatriates living in developing countries from 1998 to 2001. The results show that the percentage of people receiving one or more types of travel vaccine before departure increased from 45.6% in 1998 to 53.4% in 2001. The vaccination rates in tropical Africa and South Asia were high, but did not increase much from 1998 to 2001. On the other hand, the vaccination rates in East Asia and the Middle East, which had been low in 1998, increased dramatically, reaching over 45% by 2001.

Rates for individual vaccinations of hepatitis A, hepatitis B, and tetanus were high in all regions, while rates for yellow fever and Japanese encephalitis were high only in endemic regions.

During the period of this survey, vaccination rates of all vaccines excluding cholera and meningococcal meningitis increased. The rates of hepatitis A, hepatitis B, and tetanus dramatically increased in East Asia, the Middle East, and Latin America. The increase in rabies vaccination rate

was remarkable in Southeast Asia, the Middle East, and Latin America. Rates for yellow fever vaccinations peaked at 79.1% in tropical Africa in 1998, with almost no change after that. This is perhaps due to the fact that some of the tropical African countries demanded that travelers submit a yellow fever vaccination certificate [6]. Presently there is some doubt about the effectiveness of the cholera vaccine used in Japan, so it is possible that this caused the vaccination rates to decrease in all regions [7].

Vaccination rates for typhoid fever and meningococcal meningitis tended to be low on the whole. This was because these vaccines were not available in Japan [8]. But in 2001, the vaccination rate for typhoid fever in South Asia (10.9%) and tropical Africa (16.7%), and the rate for meningococcal meningitis in tropical Africa (20.6%) were higher than those in another areas. We assume that Japanese people living in highly endemic regions were able to find a way to receive vaccinations. For vaccines not marketed in Japan, it is still possible to receive a vaccination if a doctor privately imports the vaccines. We need to make this fact better known to Japanese medical personnel.

Looking at the overall picture, the increasing rates indicate a growing awareness among Japanese expatriates and medical personnel of the benefits of vaccination. However, nearly half of Japanese people residing in developing countries are not vaccinated. For short-term visitors, the vaccination rate is probably even lower. In a recent investigation by Kikuchi, which surveyed a Japanese tourist group visiting tropical Africa, the vaccination rate for yellow fever was high at 80% [9]. However, the rates of other vaccines such as hepatitis A and rabies were below 5%. An investigation on German tourists receiving hepatitis vaccine before going to developing countries showed a very high rate of 59% [10].

In summary, it is clear that despite some improvement, vaccination rates are still alarmingly low among Japanese travelers. The solution to this problem is better education and knowledge transfer, both to the travelers who should receive these vaccines, and to the medical personnel who con-

sult with travelers and administer vaccinations.

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