

CHANGES IN HTLV-I POSITIVE RATES AMONG PREGNANT WOMEN IN OKINAWA PRIOR TO THE EFFECTS OF MEASURES INTRODUCED TO PREVENT VERTICAL TRANSMISSION THROUGH BREAST MILK FEEDING

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Abstract: Objectives: Human T cell leukemia virus type-I (HTLV-I) is a causative agent of human T-cell leukemia and HTLV-I associated myelopathy (HAM/TSP). HTLV-I carriers are often infected vertically, especially via mother's milk. Since 1985, clinical measures have been adopted at a hospital in Okinawa to prevent vertical infections.

Methods: We examined HTLV-I antibodies in all of the women (total 11,506) who gave birth after 24 gestational weeks at a hospital on the Okinawa main island from January 1985 to December 1999.

Results: The positive rate among all pregnant women was always higher than that among primipara alone. Both figures decreased over the period studied, but the primiparity rate (36-39%) did not change significantly. The percentage of HTLV-I positive primipara pregnant women among the HTLV-I positive total was close to the primiparity rate from 1985 to 1988, but it was considerably lower than the overall primiparity rate thereafter (22-26%).

Conclusions: Preventive measures against HTLV-I infection did not contribute to the decrease in HTLV-I positive mothers before 1999 because these measures were adopted from 1985, and so there must be other reasons for the decrease in HTLV-I positive rate. Further studies on social factors and by year of birth are needed to identify factors influencing HTLV-carrier ratios among pregnant women.

Key words: HTLV-I, Okinawa, pregnancy, ATL

INTRODUCTION

Adult T cell leukemia (ATL), which develops in human T cell leukemia virus I (HTLV-I) carriers [1], is endemic in several regions of the world, including southwestern Japan [2,3]. Routes of infection are vertical, the main one, and horizontal [4]. Because there is no possibility of developing ATL after horizontal infection of HTLV-I by

sexual intercourse, one of the best ways to reduce the morbidity rate of ATL is to prevent vertical infection.

Vertical infection is transmitted primarily via mother's milk [5,6]. Thus, to prevent HTLV-I infection via this route, freeze-thawing mother's breast milk and other measures for breast milk feeding have been instituted [7,8]. It is known that these methods can prevent mother-infant infection, but it is still too early to draw a conclusion if these preventive

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measures have contributed to a decrease in the carrier rates in areas that instituted these measures.

The above measures have been applied clinically at a hospital in Okinawa since 1985. Hospital records showed that the youngest pregnant woman during the period of this study, 1985-1999, was born in 1983. Hence, none of the pregnant women were affected by the preventive measures. An examination of the changes in HTLV-I carrier rates from 1985 to 1999 will help to shed light on the impact of the clinical preventive effects of the feeding of freeze-thawed mother's breast milk and other measures, because the effects of these measures would have become apparent after 2000 when a baby born in 1985 became 15 years old. Thus we examined HTLV-I antibodies in all of the pregnant women who since 1985 gave birth at over 24 gestational weeks at a hospital on the main island of Okinawa in southwestern Japan, and we obtained interesting findings.

MATERIALS AND METHODS

Location and Population

Subjects were patients at the Toyama Obstetrical Gynecological Clinic in Ginowan City on the Okinawa main island in southwestern Japan (Fig 1). From April 1985 to March 2000, a total of 29,385 babies were born in this city, and from January 1985 to December 1999, a total of 11,506 pregnant women gave birth at over 24 gestational weeks at the hospital from which the data was collected.

Assay of serum antibodies to HTLV-I

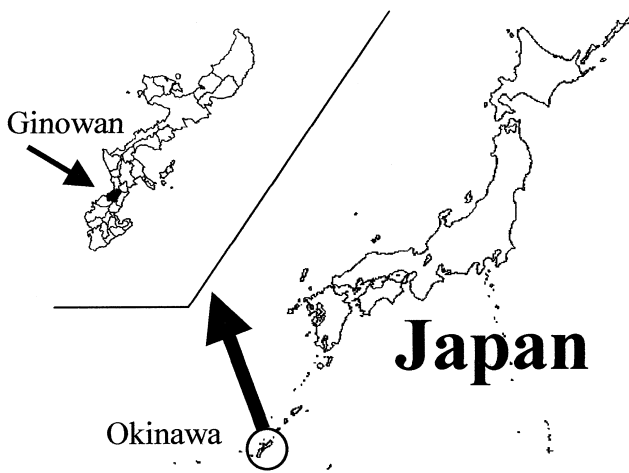


Figure 1. The location of Ginowan City on the Okinawa main island in southwestern Japan.

For particle agglutination (PA) assay and screening of HTLV-I, peripheral blood was drawn from all pregnant women after obtaining informed consent, and the results were judged as either positive or negative. Samples judged

positive by PA were confirmed by the immuno-fluorescence method using HTLV-I infected cell line MT-1 [9] originated by Hinuma et al. [10] All HTLV-I positive pregnant women were informed of the result, and before delivery they were advised to institute feeding by artificial milk or freeze-thawing of mother's milk to their newborns.

RESULTS

From January 1985 to December 1999, a total of 11,506 pregnant women (4,259 primiparas) gave birth at a gestational age of over 24 weeks at our hospital. Patient characteristics are shown in Table I. The average age of primipara pregnant women was 25.9 ± 4.6 , and that of all pregnant women was 28.6 ± 5.0 . The HTLV-I positive rate among all the pregnant women and among the primipara pregnant women alone was studied (Figure II). Though both rates became lower over the term of the study, the positive rate among all pregnant women was always higher than that among primipara pregnant women.

Table II shows the analysis of HTLV-I positive rates by birth years. The positive rate gradually decreased by birth year, especially in primipara pregnant women.

Figure III shows the changes in the overall primiparity

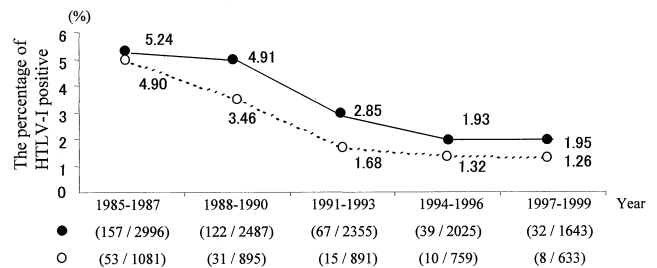


Figure 2. HTLV-I positive rate among all pregnant women and primipara pregnant women who delivered at over 24 gestational weeks. (●), total pregnant women; (○), primipara pregnant women. (numbers of positive women / all women)

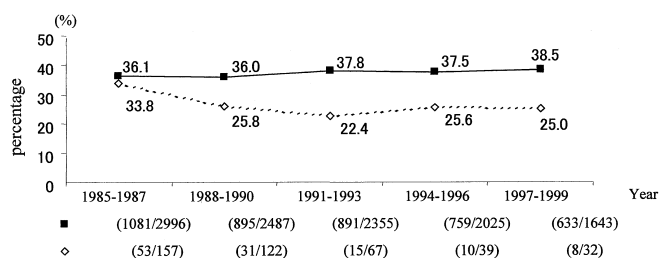


Figure 3. Primipara rate among the total of all pregnant women (■) and primipara HTLV-I positive pregnant rate among the total of all HTLV-I positive pregnant women (◇).

Table I . Characteristics of pregnant women.

years		1985 ~ 1987	1988 ~ 1990	1991 ~ 1993	1994 ~ 1996	1997 ~ 1999
Primipara	No.	1081	895	891	759	633
	Age \pm SD	26.23 \pm 4.56	25.84 \pm 4.56	25.75 \pm 4.51	25.73 \pm 4.56	26.11 \pm 4.69
Multipara	No.	2996	2487	2355	2025	1643
	Age \pm SD	30.11 \pm 4.66	30.11 \pm 4.67	30.11 \pm 4.68	30.11 \pm 4.69	30.11 \pm 4.70

All women delivered at over 24 gestational weeks from January 1985 to December 1999

Table II . HTLV-I positive rate among pregnant women by year of birth.

birth years		~ 1954	1955 ~ 1959	1960 ~ 1964	1965 ~ 1969	1970 ~ 1974	1975 ~
Primipara	% of positive	4.81	4.32	3.45	2.57	1.40	0.32
	positive/total	9/187	24/555	40/1159	32/1246	11/785	1/312
Multipara	% of positive	5.30	5.34	4.18	2.67	1.23	2.78
	positive/total	55/1037	3/104	3/105	3/106	3/107	3/108

rate and the HTLV-I positive primiparity rate. The primiparity rate tended to increase slightly within a range of 36.1-38.5%. The primiparity rate of HTLV-I positive pregnant women was close to the overall primiparity rate from 1985 to 1988, and then stabilized within 25.8-22.4%, considerably lower than the primiparity rate, thereafter.

DISCUSSION

We reported the world's first preventive measure against HTLV-I, i.e. feeding by freeze-thawing of mother's milk, and this measure and other prevention measures have been adopted in Okinawa Prefecture since 1985 [8]. Now, the preventive measures are evaluated [11,12], but that the changes in HTLV-I positive rates among pregnant women who were born before 1985 were not affected the preventive measures for mother-infant infection.

In the present study, we examined the changes in HTLV-I positive rate among pregnant women from 1985 to 1999. The positive rate among all pregnant women is clinically, but, since the same mother might deliver more than once at the same hospital, primipara pregnant women were also examined to avoid any overlapping of positive individuals.

The positive rate among primipara pregnant women and among all pregnant women decreased over time. The positive rate among primipara pregnant women decreased dramatically between 1985 and 1993, while the total positive rate began to fall rapidly about 3 years later, over the period from 1988 to 1993.

The preventive measures against HTLV-I infection, i.e. modified milk feeding and feeding by freeze-thawing of mother's breast milk, did not contribute to the decrease in the HTLV-I positive rate among mothers who delivered before 1999 because these measures have been adopted only since 1985. However, it is possible that the studies actually

affected the number of children born from women who were HTLV-I positive, because women whose first child was HTLV-I positive may have decided to avoid delivering another child so as not to worry about further HTLV-I infection. Hence, we looked for changes in the primiparity rate and its correlation with the percentage of primipara pregnant women among all HTLV-I positive pregnant women.

The percentage of primipara women among all HTLV-I positive pregnant women was close to the primiparity rate from 1985 to 1988 but was considerably lower than the primiparity rate thereafter (22-26%), indicating a difference between the pregnant women who delivered around 1988 and thereafter and those who delivered prior to this date. The cohort effect does not significantly influence the decrease in positive rate, because if HTLV-I positive women avoid delivering a second child, the primiparity rate should increase year by year, and the percentage of primipara pregnant women among the HTLV-I positive pregnant women should also increase remarkably. However, there are many possible reasons for a spontaneous decrease in the positive rate.

Kashiwagi K. et al. [13] pointed to a decrease in the number of mothers breast feeding and a shortening of the breast-feeding period.

Socioeconomic changes in Okinawa and the improvement of the health environment can also be sited as reasons for decrease in HTLV-I positive rate among pregnant women.

The aim of this study was to ascertain the changes in HTLV-I positive rates among pregnant women in Okinawa prior to any effects of the introduction of measures to prevent vertical transmission through breast milk feeding. We found a decrease in HTLV-I positive rates among pregnant women. In the further, we intend to evaluate the effects of the measures introduced to prevent vertical transmission through breast milk feeding in light of the results shown in

this study. Further studies regarding social factors, and rates by the year of birth, are needed to identify factors influencing HTLV-carrier rates among pregnant women.

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