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Twinning Rate by Month of Mother's Birth in Japan

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Abstract. Records of two hospitals and of an association of mothers of twins were analysed for the years 1924-1980, finding a total of 656, 109 and 1185 twin births, respectively. Twinning rates were higher in summer or fall, in general, but these seasonal variations occasionally changed within a short period of years, as in 1973-75 in the Association group. The twinning rate was also affected by the month of mother's birth. It was low among the mothers born around May-July in maternities up to 1960, and these mothers did not show seasonal variation of twin births. The unlike-sexed twinning rate of the mothers born in May-July was also lower than that of the other mothers, and constantly low even at higher maternal ages. A possible explanation for these phenomena is discussed.

Key words: Twinning rate, Season of birth, Season of mother's birth, Maternal age.

INTRODUCTION

Several authors [2-10, 15] have indicated a seasonality of twinning rate. We have noted [11] that the season of delivery is affected by the season of the mother's birth, and that the mothers born in a specific season showed the lowest seasonality in their own deliveries and became less infertile in an infertile season. To explain these phenomena, we have then suggested [12] the seasonal existence of some unrecognized epidemic infertile factors. We reported that the season of mother's birth also affects the sex ratio of their offsprings [13].

If fertility is affected by the season of mother's birth, is it possible that the incidence of twinning may also be affected. In this study, we examine the correlation between the twinning rate and the season of birth, maternal age, and especially the season of mother's birth as one of untested factors influencing twinning.

MATERIALS AND METHODS

Three sets of data were examined in this study. *The first set* (Hospital H) comprised 73,339 case records of the Hamada Maternity Hospital in Tokyo for the years 1924-1980, and included 648 pairs of twins and 8 sets of triplets. The 57 years were divided into two periods: one, 1924-1960, corresponding to the years when the seasonal variation of general births was prominent, with a high peak in January to March; and the other, 1961-1980, corresponding to the years when the seasonal variation of general births became flat, with only a low elevation in summer and fall seasons. *The second set* (Hospital N) comprised 11,163 case records of the Japan Red Cross Medical Center (Nisseki Hospital) in Tokyo for the years 1936-1938, and included 109 pairs of twins. *The third set* (Association) comprised the 1185 records of voluntary registrations of mothers of twins. The mothers delivered their twins during the years 1961-1980. The members of the association reside mainly in Tokyo and its vicinities.

Among items available in these case records, dates for offsprings' and mothers' births and the sexes of the offsprings were used. The analysis was performed with the aid of a computer (Hitac M-280H) at the Computer Center, University of Tokyo. The rates in this study indicate the number of twin or triplet births per 100 maternities. In the Association data, monthly distributions of twins or twins' mothers are expressed by the relative ratios to the expected distribution estimated from the general births in Tokyo, according to the Vital Statistics issued annually by the Ministry of Health and Welfare of Japan. The differences in the seasonal distributions between groups were tested by chi square tests ($df = 1$).

RESULTS

The seasonal variations of twinning in all three sets of data are shown in Fig. 1. In all three groups, lower twinning rates were generally observed in the early part of a year and higher rates in the latter half.

In the group of Association of Twins' Mothers, there were enough data for an annual analysis over the last ten years. The seasonal variations of twinning rates from 1973 to 1975 were different from those in the other years (Fig. 2). The twinning rates were high in January-February in 1973-1975, while they were low in this season and high in summer or fall in all other years. The difference between 1973-1975 and the other seven years was significant when a year was divided into January-July and August-December ($P < 0.001$, $df = 1$).

The variations of twinning by month of mother's birth are shown in Fig. 3. The seasonality appeared also in monthly twinning rates by mother's births. In maternities up to 1960, the twinning rate was generally high among mothers born in March-April, and low among mothers born around May-July, in both hospital groups (upper curves). In the years after 1960, the twinning rate was low among mothers born in April-May and not low among those born in May-July (lower curves).

With the Association data, including enough twins over a short period of years, the monthly distributions of the twinning rates have been calculated separately in two groups of mothers born in different seasons. During the years with a high twinning rate in the second half of a year, i.e., 1971-72 and 1976-80, the mothers born in May-July did not show the rise in the latter half of a year, while the other mothers did (Fig. 4). The dif-

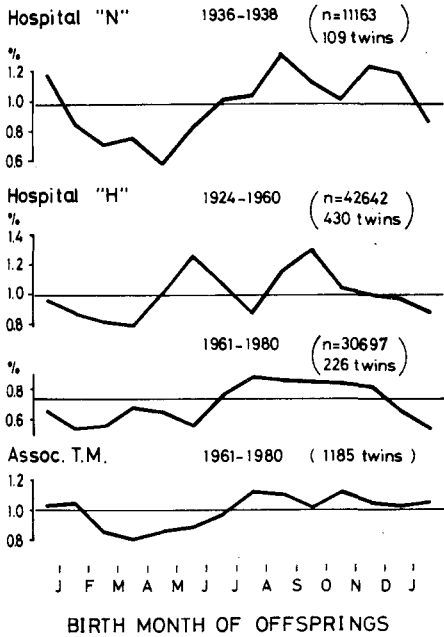


Fig. 1 - Twinning rates by birth month of offsprings. Significant differences: June-January in Hospital N ($P < 0.02$); May-October in Hospital H, 1924-1960 ($P < 0.02$); and July-November in Hospital H, 1961-1980 ($P < 0.01$).

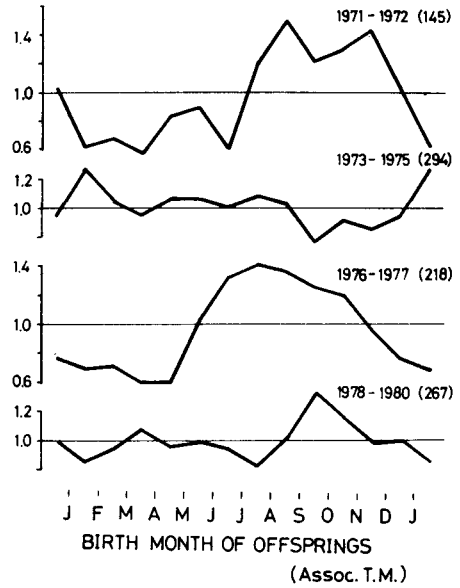


Fig. 2 - Monthly distribution of twin births, 1971-1980, in the Association group.

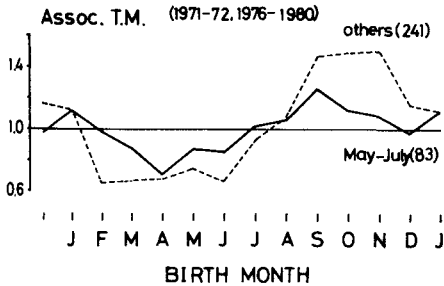


Fig. 3 - Twinning rates by birth month of mothers. Significant differences in mothers born May-October in Hospital N ($P < 0.05$) and born June-July in Hospital H, 1924-1960 ($P < 0.01$).

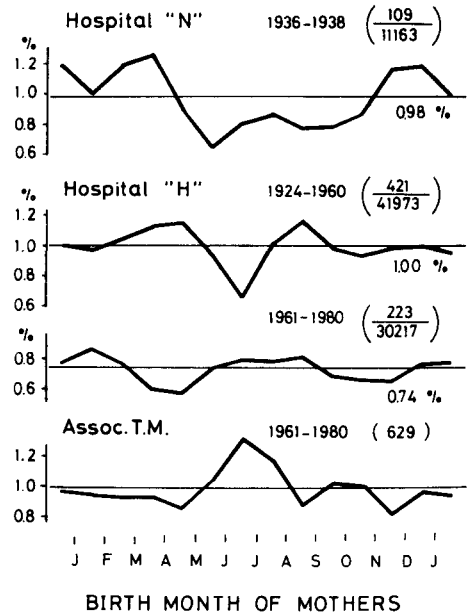


Fig. 4 - Twinning rates in mothers born in May-July and in those born in other months.

ference between the two groups of mothers is significant ($p < 0.05$, $df = 1$) for September-December and the other seasons.

Rates of unlike-sexed (U-S) twins to total twins by month of mother's birth have been compared between Hospital H and Association groups (Fig. 5). The rate was 0.18 in the former and 0.11 in the latter, which may be due to a stronger tendency of mothers of like-sexed twins to become associated. In both groups, however, the U-S twinning rate was high in mothers born in March-April and low in mothers born in May-July.

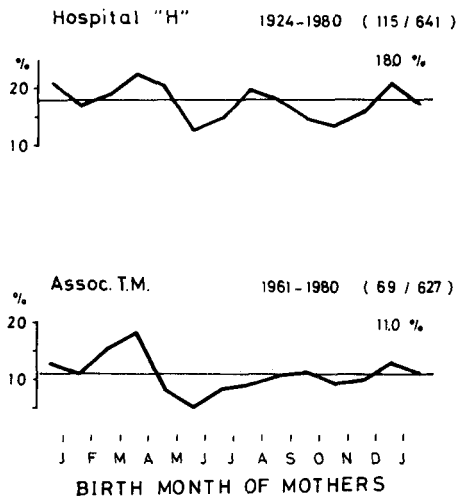


Fig. 5 - U-S twinning rates by month of mother's birth. Significant differences in the mothers born in March-April, both in Hospital H ($P < 0.02$) and in Assoc. T.M. ($P < 0.01$).

The U-S twinning rates have been compared, by maternal age and for the two periods, in the two groups of mothers born in May-July and the other months (Table), the difference being significant for the period 1924-1960 ($p < 0.005$, $df = 1$). In mothers born in May-July until 1960, the U-S twinning rate remained low even at higher maternal ages, in the period 1961-1980, both groups of mothers had practically no increase in the U-S twinning rate at their higher ages, but the mothers born in May-July also had a much lower U-S twinning rate.

TABLE. U-S Twinning Rate (Unlike-Sexed Twins/Total Twins) by Period, Season of Mother's Birth, and Maternal Age

Year of maternity	Source of data	Birth month of mothers	Maternal age				Total	
			%	N	%	N	%	N
1924-1960	Hosp. H	May-July	11	4/35	12	4/33	12	8/68
		Others	18	40/224	25	32/126	21	72/350
1961-1980	Hosp. H & Assoc.	May-July	10	16/160	8	4/49	10	20/209
		Others	13	59/469	15	25/172	13	84/641

DISCUSSION

In agreement with previous studies [6,9], the present analysis points to the existence of a seasonality of twinning (Fig. 1). In contrast with this rather long-term trend, there were occasional variations: in 1971-1980, in the Association group, the peak months fluctuated between summer and fall; in 1973-1975, January showed a peak and the other months showed no distinct seasonality (Fig. 2).

The present study has indicated that the season of mother's birth is also a possible factor of twinning (Fig. 3). Mothers born in May-July had low twinning rates in 1924-1960, and after 1960 they did not show a decrease of the twinning rate, while other mothers did. We had previously found these mothers to also have been less infertile in the years around 1930 [11], and to show the least variation in seasonality, both in total births and in twin births (Fig. 4), which may imply that seasonal variations in twinning rates are not necessarily related to meteorological variations [15]. The mothers born in May-July were also less U-S twin-prone all through the years (Fig. 5), and even at the higher maternal ages (Table).

These results suggest the possibility that more fertile mothers (perhaps those who have a more constant ovulatory function for a longer period) are less prone to multiple ovulation. Indeed, Allen [1] found no direct evidence that twin-prone women conceive more readily than other women and Wyshak [16] found the interval between marriage and first live birth to be longer among the mothers who gave birth to U-S twins.

Although we have little evidence, a speculation can be in order. One might imagine that, seasonally epidemic factor(s) make women multiple-ovulation-prone, as well as abortion-prone, through the action of the endocrine system. Women affected by these factors, prevalent in a given season, would be more likely to conceive twins, but their fertility would be reduced by the raised frequency of abortion in the same season. However, those women who were born in the season when these factors were prevalent, would be immunized, and would therefore show neither the rise of the twinning rate nor the fall of fertility in that season. The epidemic factor(s) might damage the luteal function and thus determine an increase in FSH levels, as reported by Nylander [14], and induce a twin-prone, as well as an abortion-prone state. In a preliminary study, we have in fact found FSH levels in young healthy women to be slightly higher among those born in summer, and this might be associated to our observation (Fig. 3) of higher twinning rates, in recent years, in mothers born in the summer.

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