



Acta Genet Med Gemelloi 33: 121-124 (1984)
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TWIN RESEARCH 4 – Part A: Biology and Obstetrics
Proceedings of the Fourth International Congress on Twin Studies (London 1983)

Twinning Rates and Seasonal Changes in Görlitz, Germany, from 1611 to 1860

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Abstract. Old-age twinning rates were evaluated over a period of 250 years (1611-1860), from 80,256 parish records of baptism in a church office in Görlitz, East Germany. Two periods with high and two periods with low twinning rates were observed. Twinning rates were relatively stable in spring and fall, but varied greatly in winter and summer.

Key words: Twinning rate, Secular change, Seasonal variation

INTRODUCTION

In recent decades a gradual fall in the twinning rate has been reported in many countries [2,3,5,6], the causes being usually attributed to widespread family planning or smaller family size, and younger maternity ages. However, the twinning rate has also changed before the 20th century. In Sweden, it showed its first maximum around the year 1800, and the second in the early 20th century [3]. In Finland [3], Scotland [5], and Utah [2], the first peak was observed in the middle of the 19th century, and the second before the middle of the 20th century. This suggests the existence of a cycle, with peaks approximately every 50-150 years. We therefore investigated some much older data in order to better ascertain secular changes and seasonal variations.

MATERIALS AND METHODS

Baptism records of a parish in Görlitz, East Germany, were investigated. Görlitz was an important medieval town on the main road between Eastern and Western Europe. From the late 16th century until the beginning of the industrial revolution, its population remained nearly constant at about 10,000 inhabitants, the number of births being about 250 each year. But in the 19th century, the number of births increased more than twice.

The period 1611-1860 was investigated. There were 963 multiple maternities (956 twin and 7 triplet births) among 80,256 maternities during these 250 years. The twinning rate (TR) was calculated as the rate of multiple maternities, including triplet births, to 100 maternities in the corresponding month or decade. When absolute seasonality of twin birth was to be considered, a twin birth rate (TBR) was also calculated, this being the ratio of twin births, including triplets, in a given month to the expected number of maternities (yearly number of maternities \times days of the month/365.25).

RESULTS

Secular changes in the TR over 25 decades since 1611 are shown in Fig. 1. The highest TR was observed in 1651-1660 (2.04/100 maternities). Following this peak decade, there was a low TR period (1711-1760), then again a high TR period (1761-1810), and again a low TR period, the rate being 0.66% in 1831-1840, the lowest among all the decades studied. When the 250 years are subdivided into 5 50-year periods (I-V, Fig. 1), periods I and IV are the high TR, and III and V the low TR periods. Twinning rates seem to have fluctuated secularly with a cycle of about 150 years.

Monthly distribution of the TR and maternity rates in these 5 periods is shown in Fig. 2. In all periods the monthly maternity rates, or birth rates, show two peaks; a spring peak, in February-March, and a fall peak, in September. In contrast, the TR shows a variable pattern in the 5 periods. In period IV (1761-1810), which had the highest TR (1.50%), the monthly TR shows two distinct peaks; a summer peak, in June-August, and a winter peak in December-January. However, period III (1711-1760), which had a low TR (1.06%), showed only one spring peak in April-May.

The 25 decades were then subdivided into three groups by TR level. There were 5 decades with a high TR (over 1.50%): 1631-1640, 1651-1660, 1761-1770, 1781-1790, and 1801-1810. There were then 6 decades with a low TR (less than 1.00%): 1711-1720, 1731-1740, 1751-1760, 1811-1820, 1831-1840, and 1841-1850. The remaining 14 decades had a medium TR (1.00-1.50%). The monthly distribution of the twin birth rate (TBR) in these three groups of decades is shown in Fig. 3. In the high TR decades, the two peaks of TBR in summer and winter are clearly visible. In the decades with a medium TR, these peaks disappear, and the monthly TBR is rather constant around 1.0%. In the decades with a low TR, however, summer and winter became seasons with a rather low TBR.

Thus, all through the 25 decades, spring and fall show a rather constant TBR, about 1.0%, regardless of the TR level, whereas in winter and summer the TBR varies greatly among the three groups. In these seasons, the monthly TBR is sometimes three times greater in the high TR than in the low TR decades. The variation of the TR therefore seems to be composed of the variations in winter and summer.

DISCUSSION

Secular changes in the twinning rate have been found in our data from 1611 to 1860, two periods of high TR have been identified with an interval of 150 years. Secular changes in the TR before 1800 have been investigated very little so far. However, Eriksson [3] has reported a high TR in Sweden around 1800, which coincides with the high TR in 1761-1810 in Görlitz.

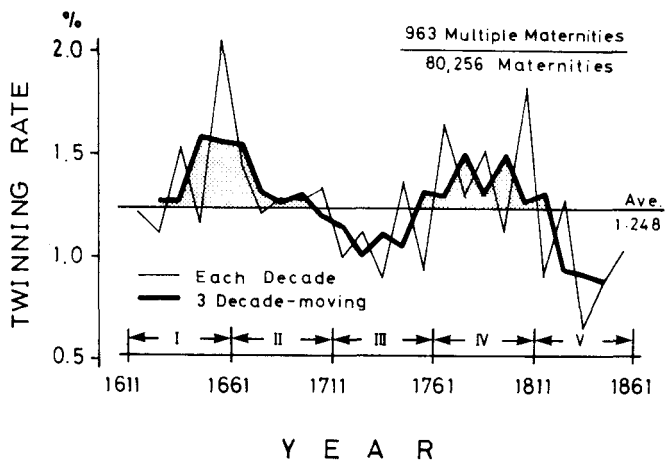


Fig. 1 - Secular changes in the twinning rate (number of multiple maternities per 100 total maternities) over 250 years (10-year intervals).

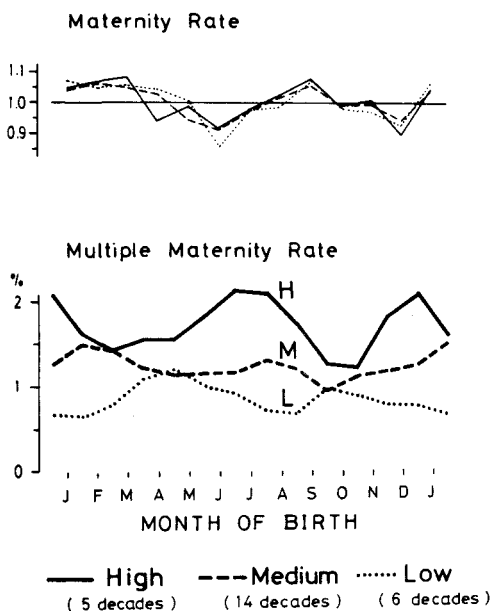


Fig. 2 - Monthly distribution of maternity rates and twinning rates in 5 50-year periods. Monthly maternity rates are the ratios of the monthly number of maternities per day to the yearly number of maternities per day. Twinning rates are plotted in 2-month moving averages.

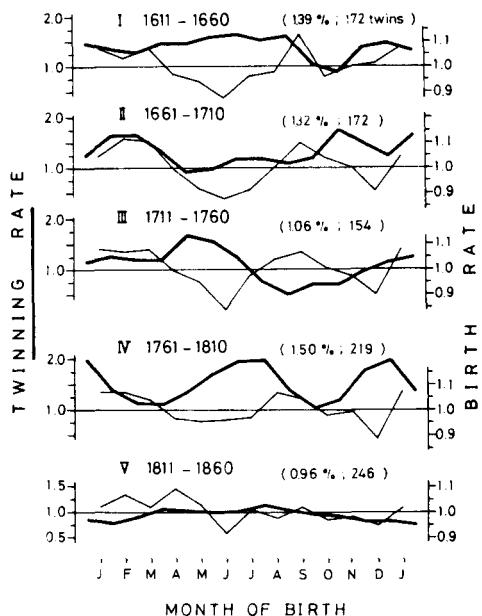


Fig. 3 - Monthly distribution of maternity rates and twin birth rates in three groups of decades with high (H, $\geq 1.50\%$), medium (M), or low (L, $\leq 1.00\%$) twinning rate.

When one observes the secular changes of the TR in various countries, as reported in the literature and including the present data (Fig. 4), the periods with a high TR seem to appear and disappear with a cycle of 50 to 150 years. Although we do not have conclusive data, especially on the old ages, it appears that there were four periods with high TR in the last four centuries; at the mid 17th, late 18th, mid 19th, and early 20th century.

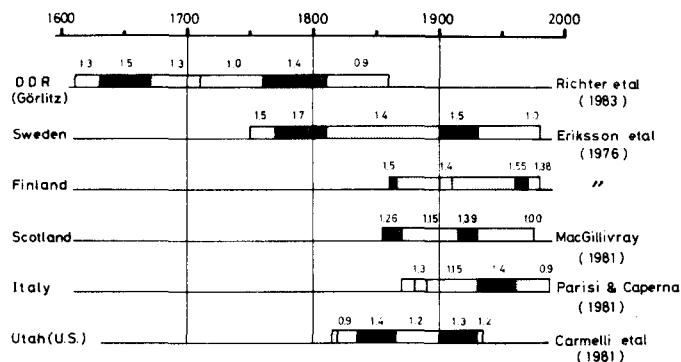


Fig. 4 - Secular changes of the twinning rate reported in the literature. Within each study, high-rate periods (solid), medium-rate periods (meshed), and low-rate periods (open) have been determined.

These secular changes seem rather consistent in all of the countries investigated with a few exceptions.

In Görlitz, and all through the years, the TR was high in winter and summer and rather constant in spring and fall. This variation did not have any relation with the seasonal distribution of the birth rates.

The TR has been reported to be influenced by genetic factors [1,3] or day light length [7]. The observation of a cyclic rise in the TR and the finding that the rise occurred in winter and summer, lead to exclude genetic and meteorological factors from the major causes of the secular changes of the TR in Görlitz. Environmental factors connected with modern civilization, such as pesticides or food contamination by chemical pollutants [4], should also be excluded, at least for the earlier changes. Some seasonally epidemic factors such as some known or so far unknown viruses which might induce multiple maternities, may perhaps be supposed to play a role.

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