Acta Genet Med Gemellol 28:259–260 (1979)
The Mendel Institute/Alan R. Liss, Inc.

Clustering of Twin Births in Space and Time

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Out of a total of 1025 twin births occurring in 11 South Moravian districts from 1972 to 1976, 638 occurred in the same time and space interval (P = 0.00037). The observed clustering suggests the existence of environmental factors influencing twinning rates.

Key words: Twinning rate, Clustering, Czechoslovakia

The register of living twins in South Moravian Region is supplemented every year. For several years, it was observed that twin births clustered in one settlement in one year, whereas the next year a similar concentration occurred, but in a different location. This phenomenon was studied by the method used by Pinkel and Nefzger to investigate the clustering of children's leukemias in space and time [8].

The preliminary results [4] were highly significant. However, the importance of differential mortality had to be considered. Therefore, a sample of all twin births was evaluated by the same method. The sample included all twin births and stillbirths that occurred in the years 1972–1976 in 11 of th 14 districts of the South Moravian Region, Czechoslovakia. The more urban, densely populated districts (Brno-city, Gottwaldov, and Jihlava) were excluded.

A time interval of six months and a distance of 1 km were chosen. In the total sample of 1025 twin births, 638 occurred in the chosen time and space interval. Using Pinkel and Nefzger's method [3], the probability of such clustering was found to be highly significant (P = 0.00037).

As Ederer et al [1] pointed out, a too-high or too-low interval both in space and time may not identify clustering even when it occurs. Thus, using one district, ie, about 100,000 inhabitants, would not provide adequate data for our purposes.

A certain inadequacy in our study is that we have evidence only of twin births, not of conceptions. There is no documentation about early abortions, spontaneous or otherwise.

Our results show that the overall constant frequency of twin births is in fact variable in space and time. We suggest that the twinning rate is influenced by environmental factors which are present or active in varying degrees in different places at different times.

0001-5660/79/2804-0259$00.80

We exclude inbreeding from the known causative factors. Twin births are too dispersed, and inbreeding in the country is very low (coefficient of inbreeding in the years 1960–1966, $F = 46.8 \times 10^{-6}$ [5]).

The influence of medical treatment seems very unlikely, and living conditions affecting Nigerian mothers, as described by Nylander [2], do not apply.

We have not yet determined to what extent clustering occurs for monozygotic and dizygotic twins. The preliminary study [4] of living twins revealed the prevalence of same-sexed twins. We are continuing our study estimating zygosity by questionnaire.

A surprising fact in our observation is the relatively short interval and the quick change in place. However, the mathematical formula used can prove the existence but not the character of exogenous factors.

Further studies in Czechoslovakia and elsewhere are needed to determine whether clustering of twin conceptions in time and space is a general phenomenon and what are the factors involved.

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