MULTIPLE BIRTHS IN SOUTHERN MORAVIA

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The frequency of living twins born in Southern Moravia in the period 1960-1970 was studied and found to be 0.67%. No differences in twinning rate due to the years, seasons, districts or towns with 10,000 and more inhabitants in comparison with other localities, were found. An interesting hitherto undescribed phenomenon of twin-birth clustering in space and time was observed.

The workers of the Pediatric Research Institute have been engaged in twin studies for several years and they are periodically completing the Multiple Birth Register in the Southern Moravia Region. In the present communication, the data from the years 1960-1970 are processed. Stillbirths, children deceased soon after birth, and pairs of whom only one twin survived, are not included.

The frequency of multiple births within the whole period under study was 0,669, that of twin births was 0,668. This value corresponds to the incidence of 1:150. Reisman and Matheny (1969) report that the incidence of living twins is 1:100. It is supposed that the significantly lower frequency of twins observed in our sample is associated with the fact that twins are more frequently products of later pregnancies, whereas in our country the average number of children per family is less than two.

Among 1888 pairs of living twins under study, 1314 were same-sexed twins, including 701 pairs of boys and 613 pairs of girls, and 574 pairs were unlike-sexed twins. The sex ratio in this sample is 109.8:100, on the boys behalf. In all children born in the same period in this region the sex ratio is 105.9:100. With regard to the fact that in our sample only living twins are included, it may be presumed that the perinatal-mortality sex ratio in multiple pregnancy does not differ significantly from that of singletons.

The time distribution of the frequency of twin births, as shown in Table 1, is practically constant. Also the season fluctuation does not show any significant differences. A higher occurrence of twins observed from October to December corresponds to the total number of births, so that this is not characteristic for multiple pregnancies.

Cannings (1969) has proved that Weinberg's twin formula is also valid for the sample of elderly twins. In this way, the estimated percentage of monozygosity in our sample was 39.2. No significant differences either in years or seasons were observed (Table 1).

Table 2 illustrates a comparison of districts. No significant differences are found in the frequency of twin births. In the distribution of suspected monozygosity, significant deviations in the extreme values (districts of Breclav, Gottwaldov, and Znojmo) are found. The division by districts, however, is rather an artificial one, corresponding better to administrative than biological units. Nevertheless, a look at the map reveals

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Table 1. *Frequency of Twin Births and Percentage of Monozygosity in Years and Seasons*

Year or season	Frequency			Monozygosity
	Same-sexed	Unlike-sexed	Total	
1960	0.390	0.164	0.554	40.74
1961	0.470	0.190	0.660	42.33
1962	0.411	0.197	0.607	35.14
1963	0.489	0.210	0.679	38.12
1964	0.503	0.179	0.682	47.59
1965	0.433	0.186	0.619	39.88
1966	0.483	0.202	0.684	41.04
1967	0.498	0.247	0.745	33.70
1968	0.421	0.214	0.635	32.48
1969	0.517	0.229	0.746	38.62
1970	0.511	0.218	0.728	40.39
January - March	0.469	0.202	0.670	40.74
April - June	0.496	0.230	0.726	36.69
July - September	0.420	0.198	0.618	35.80
October - December	0.471	0.156	0.647	45.64
1960 - 1970	0.465	0.203	0.668	39.20

Table 2. *Frequency of Twin Births and Percentage of Monozygosity in Districts of Southern Moravia*

District	Frequency			Monozygosity
	Same-sexed	Unlike-sexed	Total	
Brno (city)	0.500	0.193	0.693	44.33
Brno (country)	0.378	0.201	0.578	30.67
Blansko	0.517	0.258	0.775	33.33
Breclav	0.448	0.270	0.718	24.84
Gottwaldov	0.494	0.304	0.798	23.81
Hodonin	0.472	0.238	0.710	32.98
Jihlava	0.420	0.204	0.624	34.62
Kromeriz	0.393	0.157	0.551	42.86
Prostejov	0.541	0.218	0.759	34.88
Trebic	0.409	0.140	0.549	48.98
Uh. Hradiste	0.393	0.143	0.537	46.56
Vyskov	0.483	0.163	0.647	49.43
Znojmo	0.480	0.163	0.644	56.92
Zdar nad Saz.	0.607	0.230	0.877	38.46
Southern Moravia	0.465	0.203	0.668	39.20

Table 3. *Probability of the Same or Higher Occurrence of Couples of Twin Pairs*

	Twins		
	Same-sexed	Unlike-sexed	Total
No. of pairs	451	1021	1472
Interval: 0-6 months			
No. of couples	25	209	371
P	0.573×10^{-2}	0.910×10^{-9}	0.140×10^{-9}
Interval: 0-12 months			
No. of couples	51	341	645
P	0.169×10^{-4}	0.161×10^{-8}	0.278×10^{-8}

a variability that is not significant in any direction and differs also from that found by Vrba (1966) for the previous years. The same holds for the monozygosity rate.

The comparison of towns with 10,000 and more inhabitants with other localities does not reveal any substantial difference either in the frequency of twin births or in the monozygosity rate. Among these towns, considerable differences were observed, but no conclusions can be drawn because of the low numbers.

We were surprised by the fact that, frequently enough, two or more twin pairs occurred in the same and often even small locality within a relatively short time interval. This fact led us to search for evidence of occurrence in clusters. We have applied the method described by Pinkel and Nefzger (1959) used for the investigation of children leukemias. By means of this method one estimates the probability of the same or higher occurence of pairs than it was found (in our case, this means the pairs, or couples, of twin pairs). As Ederer et al. (1964) pointed out, a too large or, on the contrary, a too small interval both in space and time can give no evidence of clusters even when they are present. In our study the distance of 1 km and the time range of 0-6 months and 0-12 months were chosen. The results (Table 3) are highly significant.

In this study, the distribution of same-sexed and unlike-sexed couples of twin pairs were compared with the expected distribution. For both time intervals, a higher occurrence of couples of same-sexed pairs and a lower occurrence of couples of unlike-sexed pairs were found (Table 4). The comparison of the monozygosity rate in both samples of couples of twin pairs and in the whole followed-up sample revealed a strikingly high percentage of monozygosity in both samples.

Our results show that the apparently constant frequency of twin births is variable in space and time. It is influenced by various environmental factors in different localities and times. This observation is more marked in same-sexed twins, so that it may be presumed that the effects of these factors are more distinct in MZ pairs.

Data referred in the literature agree on the fact that the frequency of MZ pairs is relatively constant while the frequency of DZ pairs is very variable, in which both genetic and environmental factors play an important role. However, we have not hitherto met with a description of such factors, the characters of which would correspond to the facts

Table 4. *Occurrence of Couples of Twin Pairs*

Interval	Couples	Observed	Expected	*P*
0-6 months	Unlike-sexed/Unlike-sexed	25	35	*ns*
	Unlike-sexed/Same-sexed	137	157	*ns*
	Same-sexed/Same-sexed	209	179	< 0.025
	Total distribution	371	371	< 0.01
0-12 months	Unlike-sexed/Unlike-sexed	51	61	*ns*
	Unlike-sexed/Same-sexed	253	274	*ns*
	Same-sexed/Same-sexed	341	310	*ns*
	Total distribution	645	645	< 0.05

we found. We supposed that it was above all caused by the fact that, in the total evaluation of data for a longer time period and/or larger territorial areas, their influence was not evident. This fact was referred by Ederer et al. (1964) and we too found it in the estimation of the occurrence of twin births in years and districts.

The method used cannot, due to its mathematical character, reveal anything about the nature of these factors, just only the fact of their existence. The investigation of these factors will necessitate further effort and will be considerably more difficult.

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