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The Inheritance of DZ Twinning

A study of 18737 maternities in Ibadan, Western Nigeria

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Twinning is regarded as a very important phenomenon among the Yorubas in Western Nigeria. In this population, special ceremonies are performed to mark twin deliveries, and twin babies and their parents are given special names. Twins are therefore more readily identified, and data relating to twinning in families are likely to be fairly accurate.

Furthermore, the practice of polygamy in Western Nigeria provides a good opportunity for studying both maternal and paternal factors in the inheritance of twinning. The high incidence of twinning in the population ($45^0/_{00}$: Nylander, 1969) is also an additional advantage, since it allows a large number of twin maternities to be studied in a short space of time.

Among 18 737 deliveries in the three major hospitals in Ibadan, Western Nigeria, between October 1967 and June 1969, there were 977 twin maternities. Every mother was interrogated immediately after delivery to find out whether she or her husband was a twin or had twins previously (including those delivered by the husband's other wives), and whether she or her husband had twin siblings. Obstetric data, including maternal age and parity, were collected for each patient, and zygosity of the newborn twins was determined by sex, placentation, blood groups, placental enzymes, haemoglobin types, and G6PD electrophoretic studies, as will be described in a subsequent paper.

The twinning rates in this population and the results of zygosity studies are shown in Tab. I. Of the 977 twin pairs investigated, 83 were MZ (8.5%). The twinning rate of $52^0/_{00}$ is higher than that in the general population ($45^0/_{00}$) because of hospital selection. The MZ twinning rate is 8.5% of $52 = 4.4^0/_{00}$.

In this population, therefore, about 92% of twins at birth are DZ. Since there is a much higher perinatal and infant mortality among MZ twins, the proportion of DZ twins in the adult population is likely to be much higher than 92%. The data presented in this study, therefore, relate mainly to DZ twinning.

Tab. I. Populations investigated and twinning rates

Total N. of patients delivered in hospital between October 1967 and June 1969		18737
N. of patients who delivered twins		977
N. of MZ twin pairs		83
Proportion of MZ twins	$\left(\dfrac{83}{977} \times 100\right)$	8.5%
Twinning rate	$\left(\dfrac{977}{18737} \times 1000\right)$	$52^0/_{00}$
MZ twinning rate	$\left(\dfrac{83}{18737} \times 1000\right)$	$4.4^0/_{00}$

The five types of patients who will be discussed in this paper have been listed in Tab. II, namely: (1) those who are themselves twins; (2) those who have had twins previously; (3) those whose husbands are themselves twins; (4) those whose husbands have had twins (i.e., by other wives as well). Data for a fifth category of patients — those whose husbands have had twins by other wives — are derived by subtracting the figures for patients who have had twins previously from those for patients whose

Tab. II. Analysis of data by types of patients

Type of patients	Patients who delivered twins %	Patients who delivered singletons %
1) Patients who are themselves twins	7.4	7.9
2) Patients who have had twins previously	20.5	11.1
3) Patients whose husbands are themselves twins	6.2	7.0
4) Patients whose husbands have had twins	26.4	17.5
5) Patients whose husbands have had twins by other wives	6.0	6.4
Total N. of patients	977	17760

husbands have had twins (by other wives as well). All the patients have been divided into two groups, depending on whether they delivered twins or singletons, and the proportion of each type of patient out of the total number of patients in each group has been shown. It will be seen that the proportions of women who are themselves twins are approximately the same in the Twin and Singleton groups of women. The findings are similar for women whose husbands are themselves twins. However, the proportions of women who have had twins previously and women whose husbands have had twins previously (by other wives as well) are much higher in the Twin group of patients.

The data have been expressed as rates per thousand maternities in Tab. III.

Women who are themselves twins and those who are not have approximately the same twinning rates. Women whose husbands are themselves twins and those whose husbands are not also have similar twinning rates. However, women who have had twins previously have a twinning rate about twice that of their counterparts who have not. The twinning rate among women whose husbands have had twins by other wives is about the same as that among women whose husbands have not. This indicates that the husbands have not contributed to the twinning tendency.

Since twinning rates are influenced by maternal age and parity, the data for the two groups of women in Tab. III — those who have had twins previously and those who have not — have been analysed by maternal age and parity. In each age and parity group, women who have had twins previously are found to have much higher twinning rates than those who have not. The figures for women in the second parity group are shown in Tab. IV, to illustrate this point. It will be seen from this table that the twinning rates in both groups of women rise up to a peak at the age of 30-34 years, but the rates in the first group are *always* much higher than those in the second group.

Tab. III. Twinning rates in the different types of patients

Type of patients	Twinning rate $^0/_{00}$	Type of patients	Twinning rate $^0/_{00}$
1) Patients who are themselves twins	48.3	Patients who are not twins	52.5
2) Patients who have had twins previously	91.6	Patiens who have not had twins previously	47.0
3) Patients whose husbands are themselves twins	46.5	Patients whose husbands are not twins	52.6
4) Patients whose husbands have had twins	76.8	Patients whose husbands have not had twins	46.8
5) Patients whose husbands have had twins by other wives	49.7	Patients whose husbands have not had twins by other wives	52.3

Tab. IV. Twinning rates ($^0/_{00}$ maternities) in patients who have had two previous deliveries analysed by maternal age

Type of patients	Maternal age groups				
	15-19	20-24	25-29	30-34	35-39
Patients who have had twins previously	71.4	74.1	107.5	111.1	76.9
Patients who have not had twins previously	25.6	48.6	62.0	68.0	30.6
Total N. of patients	53	1028	1811	614	111

This study therefore indicates that in DZ twinning:

1) Mothers who have had twins previously have a much greater tendency towards twinning than mothers who have not;

2) Fathers do not contribute to the twinning tendency. This finding is in agreement with that of some authors (Morton, 1962; White and Wyshak, 1964);

3) Mothers who are themselves twins have not a higher tendency to twinning than mothers who are not. These results are contrary to those of other authors (White and Wyshak, 1964; Weinberg, 1901; etc.), and are difficult to reconcile with the theory of genetic determination of twinning by a single gene.

On the whole, the results in this study are consistent with either (1) a nongenetic determination of twinning (in which case the higher twinning rate in mothers who have had twins could be accounted for by an acquired tendency), or (2) with a genetic determination of twinning by multiple genes.

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