Dept. of Obstetrics and Gynaecology, University of Ibadan, Nigeria

Placental Forms and Zygosity Determination of Twins in Ibadan, Western Nigeria

A study of 1475 twin maternities

P. P. S. Nylander

The incidence of twinning in Western Nigeria is very high, being 45 $^0/_{00}$ (Nylander, 1969*a*), as compared with 11-12 $^0/_{00}$ in Caucasian populations (Registrar General, 1967). A recent study of twinning in Ibadan, in which zygosity of individual twin pairs was determined, has shown that the pattern of placentation and zygosity in this population is also very different from that in Caucasian populations.

As many as 1475 consecutive newborn twin pairs delivered in three hospitals in Ibadan between March 1967 and April 1969 were investigated.

The placentae of the twins were examined macroscopically by the author personally to determine the form (whether single, fused, double or separate) and the membrane relationships (whether monochorionic or dichorionic) as shown in Figs. 1 and 2. The membrane relationship was confirmed by histological examination.

Cord blood samples were collected from each twin pair and studied for (1) ABO, Rh (using antisera, C, c, D, E, e), MNSs and Gonzales blood groups and (2) G6PD electrophoretic pattern. Other blood groups like Fy^a, k and Jk, used initially, were discontinued later, because the gene frequencies in this population are such that they are uninformative for zygosity determination.

Samples of the placenta of each twin were sent in refrigerated containers to the Galton Laboratory, London University, for placental enzyme studies — phosphoglucomutase and peptidase (Hopkinson and Harris, 1968; Lewis and Harris, 1967).

Obstetric data including sex of the babies were recorded for each delivery.

Only 5% of twins in this study had monochorionic placentation compared to approximately 20% in Caucasian populations (Tab. I).

Some differences also occur in the figures for single dichorionic placentation in the Nigerian and other studies.

However, the proportion of single and double placentae in all these studies is remarkably constant, in spite of the marked differences, between the Nigerian and other studies, in monochorionic placentation and in sex distribution and zygosity pattern, as will be shown later. It seems likely, therefore, that the factors which determine arrangement of the placentae in a uterus in twin pregnancies are independent of the sex or zygosity of the twins.

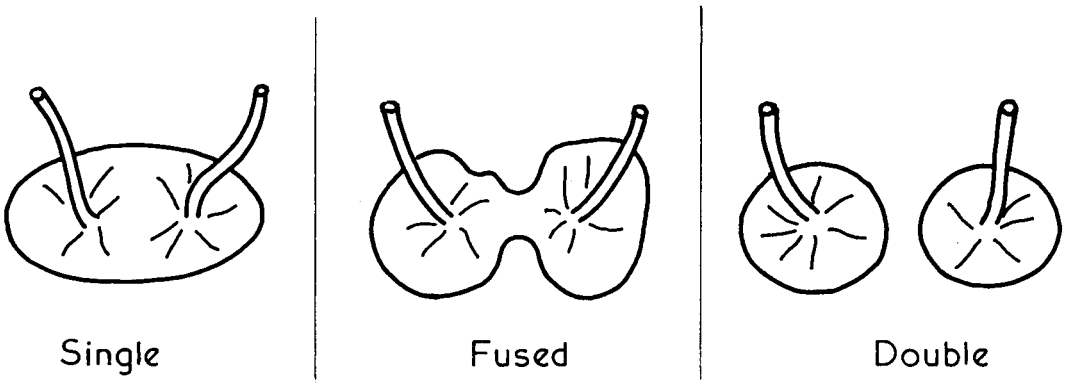

Fig. 1. (Courtesy of The Journal of Obstetrics and Gynaecology of the British Commonwealth).

Zygosity has been determined in this study by sex and genetically determined markers – blood groups and placental enzymes. A twin pair is considered DZ if the twins differ in sex or in any of the markers. If they are similar in sex and *all* the markers they are considered likely to be MZ.

In Tab. II the results of blood grouping and placental enzyme typing are shown for unlike- and like-sexed twins. A twin pair is regarded as concordant if the twins are similar for all the markers, and discordant if they differ in any of them. When *all* the tests could not be carried out they are regarded as incompletely investigated.

In the dichorionic (single and fused) group of twins, 192 unlike-sexed pairs were completely investigated. If the markers were 100% efficient they would show all the 192 twin pairs to be discordant. Instead, only 172 pairs have been shown to be discordant. This index of inefficiency of the markers can be used to correct the figure of 227 for the corresponding group of like-sexed twins (Nylander, 1969*b*). The corrected figure is therefore $\frac{192}{172} \times 227 = 253$ and the corrected figure for MZ twins (found by subtraction) is 26. Using this ratio of MZ : DZ twins (26 : 253), the number of MZ and DZ twins in the 153 twin pairs which were incompletely investigated can be calculated. By adopting a similar procedure in the double dichorionic group of twins, the corrected numbers of MZ and DZ twins can be found.

The MZ and DZ twins in the 16 pairs with unknown placentation have been calculated from the proportion of such twins in the other like-sexed twins with known placentation.

In Tab. II all the twins with monochorionic placentation are like-sexed and all those completely investigated are concordant. Other investigators have reported similar findings. This study therefore confirms the view that all twins with monochorionic placentae are MZ. Twins with dichorionic placentae may be MZ or DZ.

There are therefore 122 MZ twin pairs in the 1475 twins investigated — a propor-

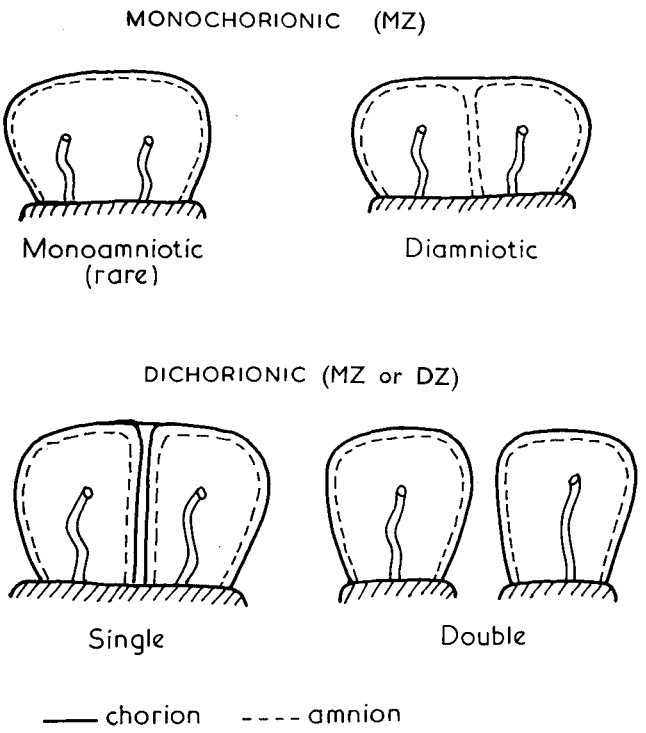

Fig. 2. (Courtesy of The Journal of Obstetrics and Gynaecology of the British Commonwealth).

Tab. I. Type of placentation in the Nigerian (Ibadan) and other twin studies

	Ibadan twin survey (Present study)		Aberdeen twin survey (Nylander, 1970)		Oxford twin survey (Strong and Corney, 1967).		Chicago twin survey (Potter, 1963)		Birmingham twin survey (Edward et al, 1967)*	
	N.	%	N.	%	N.	%	N.	%	N.	%
Monochorionic	75	5.0	114	18.7	45	22.5	117	20.6	116	19.6
Dichorionic										
Single and fused	754	51.1	210	34.5	66	33.0	192	33.9	476	80.4
Double or separate	607	41.2	250	41.0	85	42.5	239	42.2		
Placentation not known	39	2.7	34	5.6	4	2.0	19	3.4	—	—
Total	1475		608		200		567		592	

* Quoted by Strong and Corney, 1967.

https://doi.org/10.1017/S1120962300024999 Published online by Cambridge University Press

Tab. II. Placentation, sex distribution, and zygosity of Ibadan twins

Placentation	Sex			
	♂♀	♂♂ and ♀♀	?	Total
Monochorionic				
Concordant	—	41	—	41
Discordant	—	—	—	—
Incomplete investigation	—	31	3	34
Total	—	72	3	75
Dichorionic (Single and fused)				
Concordant	20	52 (MZ = 26)	—	72
Discordant	172	227 (DZ = 253)	—	399
Incomplete investigation	130	153 (MZ = 14)	—	283
		(DZ = 139)	—	—
Total	322	432	—	754
Dichorionic (Double)				
Concordant	24	29 (MZ = 3)	—	53
Discordant	146	156 (DZ = 182)	—	302
Incomplete investigation	120	132 (MZ = 2)	—	252
		(DZ = 130)		
Total	290	317	—	607
Placentation not known	23	16 (MZ = 2)	—	39
		(DZ = 14)		
Grand Total	635	837	3	1475

tion of 8.3%. The corresponding figure in studies conducted in Caucasian population is approximately 30% (Potter, 1963; Cameron, 1968). There is thus a relatively high proportion of DZ twins in the Nigerian population.

In Tab. III the data shown for Igbo-Ora (Western Nigeria) refer to the total population, in which no selection occurs. There is a higher proportion of unlike-sexed twins in the Nigerian populations, and this is consistent with the high proportion of DZ twins.

The twinning rate in Igbo-Ora is 45‰ and is considered to be representative of the incidence in Western Nigeria (Nylander, 1969*a*). The twinning rate in the present study (1475 twin pairs out of 26 200 total maternities) is 56.3‰. This higher rate is due to hospital selection. By using Weinberg's formula, the proportion of MZ twins in Igbo-Ora is found to be 8.5%, which is close to the figure of 8.3% in this

Tab. III. Distribution of like- and unlike-sexed twin pairs in population samples from Nigeria, UK, and USA

	♂♀		♂♂ and ♀♀		Total
	N.	%	N.	%	
Ibadan Hospital (Present study)	635	43.1	837	56.9	1472
Igbo-Ora (Nylander, 1969a)	81	45.8	96	54.2	177
England & Wales (Registrar General, 1965)	2999	33.5	5953	66.5	8952
USA (Caucasian) (Shipley et al, 1967)	18919	31.6	40974	68.4	59893

study. The MZ twinning rate in the general population is therefore $8.5/100 \times 45 = 3.8^0/_{00}$. The high twinning incidence in Nigeria is therefore due to a high DZ twinning rate, the MZ rate being the same as in other populations.

Furthermore, it would appear that there is an inverse relationship between the twinning rate in the general population and the proportion of twins with monochorionic placentation, and that this relation may be used in calculating the general twinning rate in a population in which the proportion of twins with monochorionic placentation is known. For example, in the UK the proportion of twins with monochorionic placentation is approximately 20% and the twinning rate is $11^0/_{00}$. In Western Nigeria, where the proportion of twins with monochorionic placentae is 5%, the twinning rate in the general population should be $11 \times 20/5 = 44^0/_{00}$, which is close to the rate for Igbo-Ora.

Acknowledgments. I would like to thank the staff of the Obstetric Dept. in Adeoyo, Oke-Offa and University College Hospitals, for cooperation in collection of specimens; Prof. Luzzatto and the staff of the Blood Transfusion Unit, University College Hospital, Ibadan, for carrying out the blood grouping of the cord blood sanples; Dr. T. E. Cleghorn, Director, National Blood Transfusion Service, N London, for supplying the Gonzales antisera used in this study; Prof. H. Harris and the staff of the Human Biochemical Genetic Unit, Galton Laboratory, London University, for typing the placental enzymes; and the staff of the Twinning Research Project, Obstetric Dept., University of Ibadan, for assistance in collecting the data.

The study was financed by the University of Ibadan and the Oxford Regional Hospital Board.

References

Cameron A. H. (1968). The Birmingham Twin Survey. Proc. Roy. Soc. Med., **61**: 229.

Edward J. H., Cameron A. H., Wingham J. (1967). In S. J. Strong and G. Corney: The Placenta in Twin Pregnancy. Pergamon Press, Oxford.

Hopkinson D. A., Harris H. (1968). Ann. Hum. Genet., **31**: 359.

Lewis W. H. P., Harris H. (1967). Nature (London), **215**: 351.

Nylander P. P. S. (1969*a*). The frequency of twinning in a rural community in Western Nigeria. Ann. Hum. Genet., **33**: 41.

NYLANDER P. P. S. (1969*b*). The value of the placenta in the determination of zygosity. A study of 1052 Nigerian twin maternities. J. Obstet. Gynaec. Brit. Comm., **76:** 699.
— (1970). J. Obstet. Gynaec. Brit. Comm. (In press).
POTTER E. L. (1963). Twin zygosity and placental form in relation to the outcome of pregnancy. Amer. J. Obstet. Gynec., **87:** 566.
REGISTRAR GENERAL (1967). Statistical Review of England and Wales for the year 1965.
SHIPLEY P. W., WRAY J. A., HECHTER H. H., ARELLANO M. G., BORHANI N. O. (1967). Frequency of twinning in California: its relationship to maternal age, parity and race. Amer. J. Epidem., **85:** 147.
STRONG S. J., CORNEY G. (1967). The Placenta in Twin Pregnancy. Pergamon Press, Oxford.
WEINBERG W. (1902). Beiträge zur Physiologie und Pathologie der Mehrlingsgeburten beim Menschen. Pflüger. Arch. Ges. Physiol., **88:** 346.

Dr. P. P. S. NYLANDER, Dept. of Obstetrics and Gynaecology, University of Ibadan, Nigeria.