

Studies on Twins

IV. Twinning in Madhya Pradesh

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SUMMARY

The high rate of twinning in rural areas is suggested to be due to higher coefficient of inbreeding, better physical conditions of mothers on the countryside and higher mean birth order. Family data indicate the frequent role of maternal genotype in DZ twinning.

Twinning research involves many fundamental problems in biology. However, much attention has been paid to the twinning rates, which show highly significant secular variations and even vary widely for different races (Stern, 1960; Gedda, 1961; Eriksson, 1962; Gittelsohn and Milham, 1965). The existence of hereditary pattern and certain adjuvant factors in DZ twinning (Weinberg, 1901; Dahlberg, 1926; Greulich, 1934; Gedda, 1961; Gedda and Brenci, 1965; Eriksson, 1964; White and Wyshak, 1964) have been reported.

Although twinning rate in India was calculated by Sarkar (Personal communication), Sarkar and Sarkar (1967) and others (Gates, 1957), no attempt was made to compare the frequencies of twinning in urban and rural parts. Present studies have emphasized these facts and also include 23 families for the inheritance of twinning.

Information on birth data was requested to 17 different hospitals of the province, but only two provided the answer. Information, however, was obtained by personal approaches to the government and private maternity centres of different places.

Since tendency to nonhospitalization of pregnant woman is most frequent in rural townships, birth records were also collected by personal visits of the sanitary inspectors, village *patwaris* and the author himself. During this, 6 families (4 rural) have been recorded to yield twin births in more than one generation and 17 families having at least two twin deliveries in the present generation.

Results and Discussion

FREQUENCY. Despite the fact that births, marriages and deaths are not adequately recorded in India (Haldane, 1965) it has been possible to record 89 344 births (since 1963 onwards) in urban districts and 15 890 births in rural townships of Madhya Pradesh. Individual and total frequencies are calculated in Tab. I. Unreliable data have been excluded. Twinning rates appear higher in rural areas; Komai and Fukuoka (1936) in Japan and Eriksson and Fellman (1967) in Finland have reported similar findings.

The lower twinning rate in urban areas (cf. Tab. I and Fig. 1) may be chiefly due to the greater amount of family planning, increased urbanisation and improvement in communications, thus minimizing consanguineous marriages.

Besides, higher coefficients of inbreeding in rural areas (Dronamraju and Meera Khan, 1961; Sanghvi, 1966; Goswami, 1969), better physical conditions of the mothers on the countryside, higher mean birth order, and more twinning disposed ages (higher mean age of mothers in rural areas; unpublished data) would be other causes for higher twinning rates in rural than in urban populations.

INHERITANCE. Studies have been made in 4 rural (Figs. 1-4) and 2 urban (Figs.

Tab. I. Twinning frequency in urban and rural townships in M. P.

Places	N. of total births	N. of twin births	Frequency	
Urban	Indore	22 414	282	0.012
	Ujjain	14 518	144	0.009
	Gwalior	37 586	308	0.008
	Bhopal	14 826	217	0.014
	Total	89 344	951	0.011
Rural	Datia	3 220	29	0.009
	Rewa	1 228	48	0.039
	Gwalior	7 432	138	0.018
	Agar	2 023	53	0.026
	Narsinghgarh	1 987	15	0.007
	Total	15 890	283	0.018

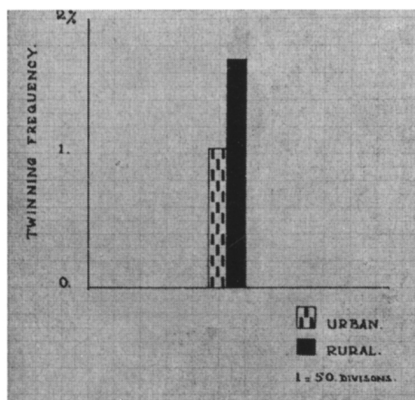


Fig. 1. Higher twinning frequency in rural than urban areas

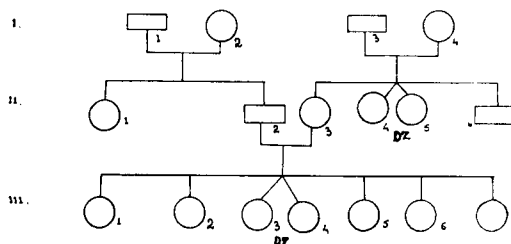


Fig. 2. Rural family showing two DZ twin pairs over two generations

5-6) families. Data are summarized in Tab. II, which indicates that MZ twinning has no increased tendency to reappear in pedigrees in which either MZ or DZ twin births occurred, while there is a decidedly increased tendency to recurrence of DZ twinning. Other 17 families yielded record for the present generation only, including 17 mothers and 35 twin births. The total distribution of twin pairs in relation to maternal age is shown in Tab. III.

Zygoty was ascertained by polysymptomatic diagnosis (Goswami, 1967, 1968 *a, b*).

In the family data the proportion of opposite-sexed twins is more than 50% (Tab. III). Of special interest is the case of a rural family (Fig. 4), in which a female cotwin of a DZ pair (II. 2) married twice, each time giving birth to DZ twins. These findings largely agree with the studies of Eriksson and Fellman (Personal communication) on Åland Islands. White and Wyshak (1964) and Gedda and Brenci (1965) have shown that the genotype of the mother affects the frequency of DZ twinning, while that of father does not. Gedda and Brenci (1965) also concluded that the

Tab. II. Family data

Figure N.	Mother		Twin pairs		
	Generation	Age	DZ		MZ
			Same-sexed	Opposite-sexed	
2	I ₄	39	1	—	—
	II ₃	40	1	—	—
3	I ₂	45	2	—	—
	II ₁	39	—	1	—
	II ₇	27	—	1	—
4	I ₂	38	1	—	—
	II ₂	36	—	1	—
	II ₂	43	—	1	—
5	I ₂	39	—	1	—
	III ₂	38	—	1	—
	IV ₇	40	2	—	1
6	I ₄	34	—	1	—
	II ₈	29	1	1	—
	II ₁	41	—	1	—
7	III ₅	39	—	1	—
	IV ₁	35	1	—	—
	IV ₆	27*	1	—	1

* First cousin marriage

Tab. III. Distribution of twin pairs in relation to maternal age

Maternal age	N. of maternities	Twin pairs		
		DZ		MZ
		Opposite-sexed	Same-sexed	
Below 30	8	2	4	2
31-35	5	2	1	2
36-40	24	15	8	1
41-45	14	9	4	1
46-above	6	2	3	1
Total	57	30	20	7

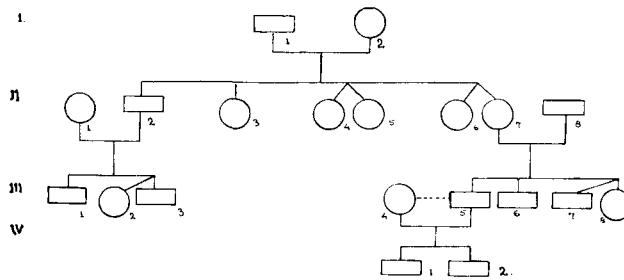


Fig. 3. Rural family showing four twin maternities. A female DZ cotwin (II.7) has given birth to an opposite-sexed DZ pair, (III.7-8), while her brother (II.2) has also produced a DZ pair (III.2-3).

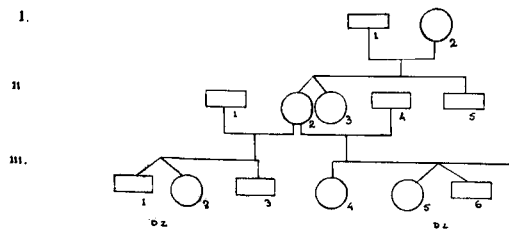


Fig. 4. Rural family showing a female DZ cotwin (II.2) marrying twice and each time giving birth to opposite-sexed DZ twin pairs (III.1-2 and III.5-6).

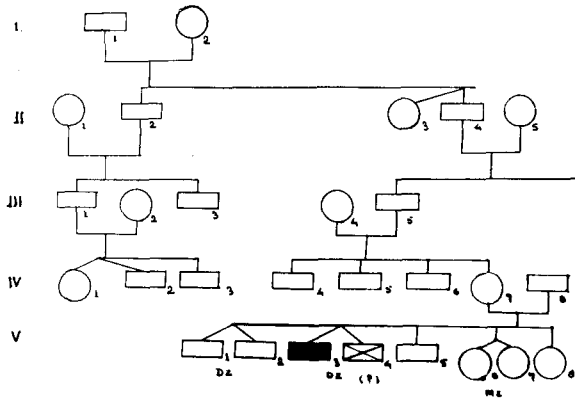


Fig. 5. Rural family showing three twin pairs in one generation. V.3 died in infancy and V.4 is under treatment. V.6-7 is a MZ pair.

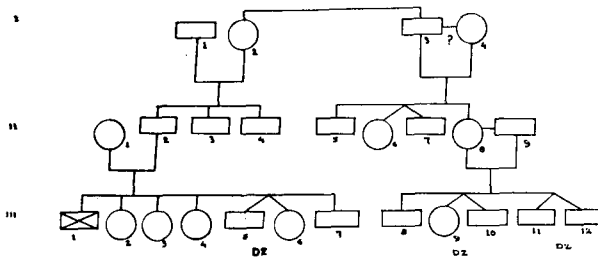


Fig. 6. Urban family showing four DZ twin pairs. Parents of II.6-7 are distantly related; III.9-10 and III.11-12 are also borne to consanguineous parents. Maternal genotype (II.8) seems to influence DZ twin births.

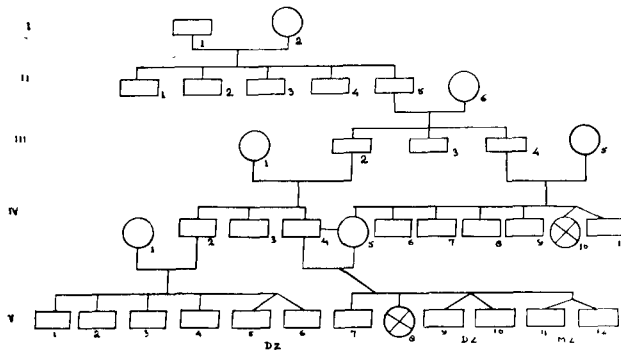


Fig. 7. Urban family showing four twin births over two generations (III and IV). IV.10 was hospitalized (now deceased). IV. 4 and 5 are the consanguineous parents of one same-sexed DZ (V.9-10) and one MZ pair.

twinning rate is limited to the female sex and is manifested by the occurrence of twins in the next generation. By studying the cases of twinning induced in sterile women by administration of human menopausal gonadotrophin (HMG), they observed that cases were limited to DZ or plurizygous twinning.

Although MZ and DZ twin maternities do take place in every age group, significantly high proportions of opposite-sexed twins in two age groups (36-45) seem to support the hypothesis of Wedervang (Eriksson and Fellman, 1967) that the increased number of opposite-sexed twin maternities in mothers of advanced age could be due to their lower chances of abortions for these twins than for the same-sexed ones, containing all MZ twins.

Acknowledgment. I am grateful to Dr. A. W. Eriksson and Mr. J. Fellman (Finland) for their suggestions and improvement; to Prof. Gedda (Rome), Professor Kalmus (London) and Dr. Ravi Prakash (Indore) for their encouragement and guidance; and to Patwaris, Sanitary Inspectors for their hearty cooperation.

Thanks are also due to the University Grants Commission, New Delhi, for the financial assistance.

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RIASSUNTO

Viene avanzata l'ipotesi che l'elevata gemelliparità nelle aree rurali sia dovuta al più alto coefficiente di consanguineità, alle migliori condizioni fisiche materne e al più alto ordine di genitura. I dati familiari indicano il ruolo del genotipo materno nelle gemellanze DZ.

RÉSUMÉ

L'auteur attribue la gémelliparité plus élevée des populations rurales à la consanguinité, aux meilleures conditions physiques maternelles et au rang de naissance plus avancé. Les données familiales indiquent le rôle du génotype maternel dans les naissances gémellaires DZ.

ZUSAMMENFASSUNG

Verf. vermutet, dass die höhere Zahl der Zwillingsgeburten bei der Landbevölkerung durch Blutsverwandtschaft, bessere Gesundheit der Mutter und den höheren Geburtenindex bedingt sind. Aus den Erhebungen zeigt sich, dass bei den ZZ-Geburten der mütterliche Genotyp von Bedeutung ist.

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