

TWINNING IN INDIA

H.K. GOSWAMI, K.V. WAGH

Department of Botany, Government Science College, and Department of Obstetrics and Gynecology, G.R. Medical College, Gwalior, India

The incidence of twinning in India, as estimated on the basis of data from the various types of maternity centers, so as to include both urban and rural population, appears to be 15.97 per thousand (12.6 DZ, 3.3 MZ). The incidence is significantly higher in rural than urban populations (18.1 vs. 11.8 per thousand). It is suggested that this may be accompanied with a higher production of DZ, possibly opposite-sexed twins.

The frequency of the twinning phenomenon has been shown to undergo the influence of anthropological, ethnic, genetic, and socioeconomic variables among populations (Eriksson 1964, Bulmer 1970). Now, the Indian subcontinent is characterized by a tremendous amount of variability of socioenvironmental conditions, transport and communication facilities, and even marriage systems (Goswami 1970a). Thus, the figures derived by only the major hospitals of the country (Sarkar and Sarkar 1967, Bulmer 1970) may not be providing a true picture of the incidence of twinning in India.

A survey of hospitals and maternity clinics located in towns and villages of the various parts of the country was therefore undertaken. Of course, there still remain remote and indistinct areas which could not be covered at present.

Data on twinning have been generally obtained from the hospitals mainly by postal correspondence, and Sarkar could thus cover the period from 1936 to 1964. Questionnaires were sent to hospitals and Sarkar and Sarkar (1967) have mentioned that the information so obtained from 10 hospitals of the country became fairly representative.

In our study, only 5 of the 27 hospitals contacted gave postal information. Attempts were then made to go to maternity centers, hospitals, and primary health centers, and directly collect data with the help of the local medical staff. It was thus realized that no center could be strictly categorized as covering an urban or rural population, and that the following classification could be basically adopted for the Indian population:

A. Private clinics, which receive 25-30% women from villages and 70-75% from town;

B. Government hospitals and maternity clinics where the ratio nearly becomes 50:50;

C. Primary health centers situated in the periphery of township or other small places and essentially receiving village population;

D. Maternity centers of isolated populations.

Twinning data (inclusive of stillbirths) as obtained from the four types of maternity centers, are shown in Table 1. Earlier data (Goswami 1970b) have been included, so that the period covered becomes 1963-73, though not all centers have yielded information for the total period. Nevertheless, twinning estimates from 161,613 births covering 14 townships of Central India seem to be fairly representative of the general population.

The statistical analysis shows twinning frequencies not to differ significantly from A to B type maternity centers ($t = 1.8$; 12 *DF*), nor from B to C types ($t = 1.0$; 12 *DF*). A significant difference, however, is found between types A and C ($t = 2.33$; 8 *DF*; significant at 5% level), thereby meaning that the higher twinning rate might be due to increased number of mothers of rural background.

The fourth category (isolate population) only consists of Jagdalpur data and has therefore not been compared with other localities. It may be noted that a good proportion of tribal women in this area suffer of venereal diseases, with termination of pregnancy and general infertility being among the commonest complaints. We suspect that there may also be physiognomic factors (Eriksson 1964) which influence the low twinning rate in this population sample.

Table 1. *Twinning data*

Maternity centers and places of investigation	No. of centers studied	Total maternities ^a	Frequency of twin births ^a	
<i>A Type: Private Clinics</i>				
1. Gwalior	2	2,007	0.0114	
2. Jabalpur	1	1,128	0.0133	
3. Bilaspur	1	1,756	0.0019	
4. Indore	1	2,982	0.0114	Mean 10.7
5. Ujjain	1	2,790	0.0107	SD 4.2
6. Bhopal ^b	1	1,040	0.0153	
Total	7	11,703	0.0118	
<i>B Type: Main Government Hospitals and Maternity Clinics</i>				
1. Indore	2	22,414	0.0152	
2. Gwalior	3	43,736	0.0178	
3. Jabalpur	1	11,024	0.0170	
4. Rewa ^b	1	1,228	0.0390	Mean 17.6
5. Datia	1	3,220	0.0090	SD 8.6
6. Jhansi ^b	1	2,879	0.0177	
7. Ujjain	1	13,728	0.0008	
8. Allahabad	1	25,758	0.0165	
Total	11	123,977	0.0158	
<i>C Type: Primary Health Centers situated in the periphery of townships</i>				
1. Rewa ^b	1	1,827	0.0377	
2. Bhopal	2	13,786	0.0145	
3. Agar	1	2,023	0.0261	Mean 23.3
4. Narsingharh	1	1,987	0.0075	SD 11.4
5. Morena	1	1,256	0.0374	
6. Morar (Gwalior)	1	3,984	0.0168	
Total	7	24,863	0.0181	
<i>D Type: Isolated Population</i>				
1. Jagdalpur	1	1,070	0.0065	

^a Including stillbirths.

^b Includes caste samples with higher inbreeding.

Table 2. *Twinning incidence in India*

Author and year	Total maternities	No. of twin births	Incidence per 1000 maternities
Sarkar (1944, 1958)	695,329	8,089	11.63
Sarkar and Sarkar (1967)	478,195	4,817	10.75
<i>Present data (including Goswami 1970)</i>			
A-type population	11,703	139	11.8
B-type population	123,977	1,973	15.8
C-type population	24,863	452	18.1
D-type population	1,070	6	6.5
Total	161,613	2,570	15.90
Total, excluding Jagdalpur, D-type population	160,543	2,564	15.97

Table 3. *Sex and zygosity* in Indian twins*

Period and source	No. of twins				Twins per thousand	
	MM	MF	FF	Total	MZ	DZ
1936-'42 (Sarkar 1944)	880	807	808	2,495	3.53	6.47
1942-'47 (Sarkar 1958)	1,286	1,128	1,260	3,674	3.86	6.14
1958-'64 (Sarkar & Sarkar 1967)	1,625	1,483	1,559	4,667	3.445	6.355
1963-'73 (Goswami 1970 and present data):						
A-type centre	48	50	41	139	4.18	8.56
B-type centre	494	781	698	1,973	3.32	12.59
C-type centre	178	184	90	452	3.37	14.01
All types	720	1,015	829	2,564	3.32	12.6

* $MZ = (L - U)/N$, $DZ = 2U/N$, where L and U are the numbers of like sexed and unlike sexed twin maternities in a total of N maternities (our value for $N = 160,543$ maternities).

Table 4. *Proportion of unlike sexed twins in Indian samples*

Authors	Total no. of twins (N)	No. of unlike sexed twins			Proportion of unlike sexed twins (D/N)
		Observed (D)	Expected	χ^2	
Sarkar's data:					
1. 1936-'42	2,495	807			0.323
2. 1942-'47	3,674	1,128			0.307
3. 1959-'64	4,667	1,483			0.318
Present data (1963-73):					
1. A-type centre	139	50	46	0.34; $P > 0.50$	0.352
2. B-type centre	1,973	781	657	23.40; $P < 0.001$	0.395
3. C-type centre	452	184	151	7.21; $P < 0.01$	0.334

As shown in Table 2, the frequency of the twinning phenomenon appears to have remarkably increased in India in recent years. It is however more likely that previous estimates, as derived from the major hospitals of the country, were biased by the lack of the rural population.

If we exclude Jagdalpur data, the general frequency is of 15.97 per thousand maternities, which is similar to the rates for Scandinavia (15.1-15.6, according to Eriksson and Fellman 1967). This is higher than the range of 11-12 per thousand typical of most Caucasoid populations, but is considerably lower than the estimate from Nigeria (45.1 per thousand, according to Nylander 1969 and Nylander and Corney 1969), which is still the highest in the world.

Data from Japan (Komai and Fukuoka 1936), Finland (Eriksson and Fellman 1967), and India (Goswami 1970*b*) have indicated higher twinning rates in rural areas. On the other hand, in Nigeria, Nylander (1967) indicated higher rates for urban hospitals. Reasons for a higher incidence in rural areas are not exactly known, but we know that DZ twinning is positively correlated with maternal age. In India, maternal age is much higher in villages than in urban areas, although it may now have declined due to increased family planning (barring a few castes even in towns).

Higher twinning incidence may also be attributed to the role of heredity which is almost conclusively proved for DZ twinning. Now, our DZ twinning rates, as shown in Table 3, are considerably higher than the estimates given by Bulmer (1970) for both Asian and European populations (12.6 vs. 5-9 per thousand).

Finally, the proportion of opposite-sexed twins, as given in Table 4, appears to be significantly

increased in maternity centers of B and C types which would tend to indicate, although not categorically, that the rise in twinning incidence in the country may be accompanied with an increased production of opposite-sexed twins.

Acknowledgment

We are grateful to several medical officers, doctors and nurses, of the various hospitals and clinics, for their hearty cooperation during the collection of data. Our thanks are also due to Dr. B.M. Agrawal, Department of Mathematics, Government Science College, Gwalior, for his help in the statistical analysis of the data.

REFERENCES

- Bulmer M.G. 1970. *The Biology of Twinning in Man*. Oxford: Clarendon Press.
- Eriksson A.W. 1964. Pituitary gonadotrophin and dizygotic twinning. *Lancet*, 2: 1298-1299.
- Eriksson A.W., Fellman J. 1967. Twinning in relation to the marital status of the mother. *Acta Genet. (Basel)*, 17: 385-398.
- Goswami H.K. 1970*a*. Frequency of consanguineous marriages in Madhya Pradesh. *Acta Genet. Med. Gemellol. (Roma)*, 19: 486.
- Goswami H.K. 1970*b*. Studies on twins. IV. Twinning in Madhya Pradesh. *Acta Genet. Med. Gemellol. (Roma)*, 19: 465-471.
- Komai T., Fukuoka G. 1936. Frequency of multiple births among the Japanese and related peoples. *Am. J. Phys. Anthropol.*, 21: 433-477.
- Nylander P.P.S. 1969. The frequency of twinning in a rural community in Western Nigeria. *Ann. Hum. Genet.*, 33: 41-44.
- Nylander P.P.S., Corney G. 1969. Placentation and zygosity of twins in Ibadan, Nigeria. *Ann. Hum. Genet.*, 33: 31-40.
- Sarkar S.S. 1944. The frequency of multiple births in India. *Trans. Bose Res. Inst.*, 16: 1-9.
- Sarkar S.S. 1958. Further studies on the frequency of multiple births in India. *Man in India*, 38: 98-104.
- Sarkar S.S., Sarkar J. 1967. Twin studies in India. *Trans. Bose Res. Inst.*, 30: 235-238.