

## Studies on Twins

### II. Typhoid favours Cotwins

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Finding of a MZ pair is of utmost importance in both Medical and Clinical Genetics (Gedda, 1961). The decision regarding the zygosity, with a minimum possibility of error can only be made on the basis of the relative probabilities of the hypotheses of their being MZ. Numerous tests have been adopted by different workers throughout the world mainly on anthropometric, physical, mental and pathological records with applicable statistical approaches to evaluate and subsequently combine the data.

Data on these lines were collected by sending proforma and interviewing personally twins, sibs and their parents, teachers, concerned doctors, and medical officers during April, 1964 - January, 1966, from different parts of Madhya Pradesh.

Diagnostic procedures (Polysymptomatic diagnosis; WHO, 1966) have already been described earlier (Goswami, 1967). These are based on the records of degree of similarity in general appearance, hair, eyes, skin, ears and hands including dermal ridge patterns (Inouye, 1956; Henry, 1901). Heights and head circumferences were measured and various mental tests, recording, nature, tendency; general liking; sports or other activities (Gedda, 1960); habits, (Kaiz, 1956; Friberg, 1959); school record and degree of intelligence, and sense of responsibility or devotion towards profession were applied.

Data on comparison of pair differences in finger ridge counts (pattern of ulnar loop; presently for only 18 MZ and 38 sib pairs) and in stature between MZ twins and like sexed sibs are shown in Tab. I and Tab. II respectively.

Since these traits have already been proved to be useful addition to the diagnostic tests (Newman et al, 1937; Smith and Penrose, 1955), data presented in both tables (I and II), in addition to recorded concordance in physical and mental traits (unpublished data) are in conformity with the monozygosity of twin pairs (Inouye, 1956; Stern, 1960).

Pathological findings generally include blood groups (Race and Sanger, 1962; Smith and Penrose, 1955), certain serological tests, and concordance for a disease incidence. First two tests, however, are performed in well equipped laboratories as occasional errors may lead to misclassification of MZ twins.

Five diseases have been recorded for 26 MZ, 98 DZ twins and 107 sib pairs in

**Tab. I. Relative chances in favour of DZ twin pairs according to finger ridge counts**

Differences between counts	N. of pairs		Percentage of pairs		Relative chances in favour of DZ pair (d/m)
	MZ twins	Like sexed sibs	MZ twins (m)	Sibs (d)	
0-2	2	0	11.11	0	0.
3-5	4	1	22.22	2.62	0.11
6-8	5	2	27.78	5.26	0.18
9-11	3	2	16.66	5.26	0.31
12-14	2	3	11.11	7.89	0.71
15-17	1	3	5.55	7.89	1.42
18-20	1	27	5.55	71.06	12.80
	18	38	99.98	99.98	1

**Tab. II. Relative chances in favour of DZ twin pairs according to differences in stature**

Difference (cms)	N. of pairs		Percentages		Relative chances in favour of DZ pair (d/m)
	MZ twins	Sibs	MZ twins (m)	Sibs (d)	
0-1.9	7	1	38.88	2.63	0.06
2-3.9	6	3	33.33	7.89	0.23
4-5.9	4	5	22.22	13.15	0.59
6-	1	29	5.55	76.31	13.74
	18	38	99.98	99.98	1

**Tab. III. Various disease incidences and concordance-discordance recorded in members of 26 MZ and 98 DZ twin pairs**

Disease	N. of pairs	MZ pairs				N. of pairs	DZ pairs			
		One	Both	++	+—		One	Both	++	+—
1. Measles	6	1	5	6	—	9	2	7	3	6
2. Measles + Smallpox	3	2	1	2	1	10	9	1	2	8
3. Meas. Smp. + Typhoid	4	4	—	1	3	12	12	—	1	11
4. Meas. + T. B.	2	—	2	1	1	5	3	2	—	5
5. Pleurisy	1	—	1	1	—	2	1	1	—	2
6. Typhoid	8	8	—	—	8	39	39	—	3	36
7. N. disease	2	—	—	2	—	21	—	—	7	14
	26	15	9	13	13	98	66	11	16	82

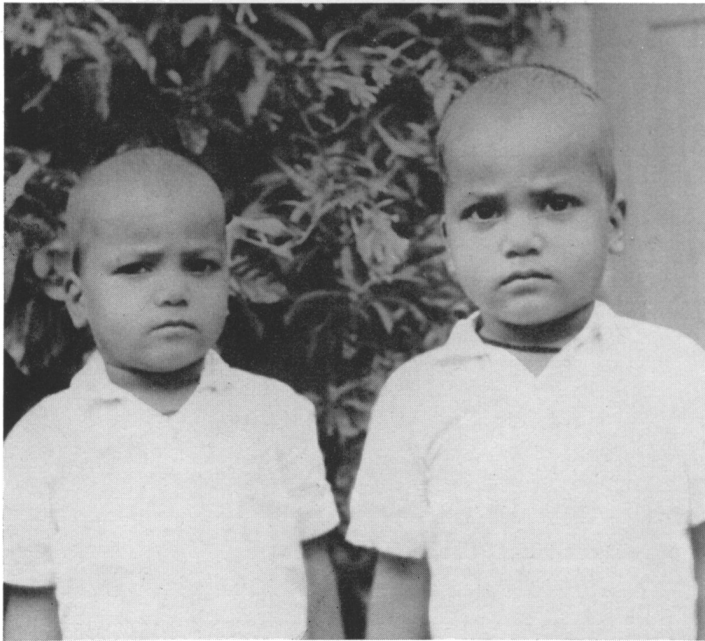


Fig. 1. Sewa and Mewa (MZ; 6 yrs.) from Agar. Mewa suffered from typhoid and now has become stouter and discordant.

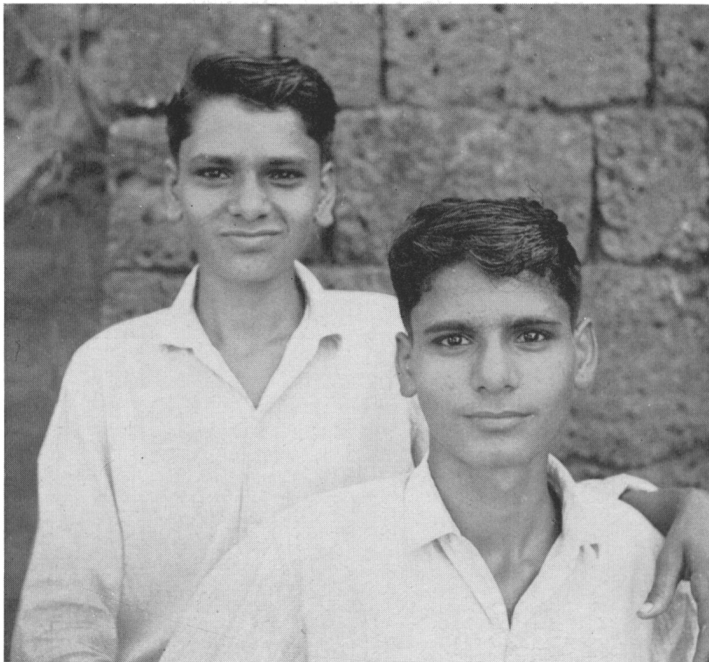


Fig. 2. Badri and Yashwant Singh (MZ; 16 yrs.) remained identical even after both had contracted measles and smallpox at the age of 5. Later Yashwant (at 11) suffered from typhoid and now is more healthy, intelligent and discordant in anthropometric traits.

Fig. 3. Srivastava brothers (DZ; 8 yrs.) are a discordant pair since birth.

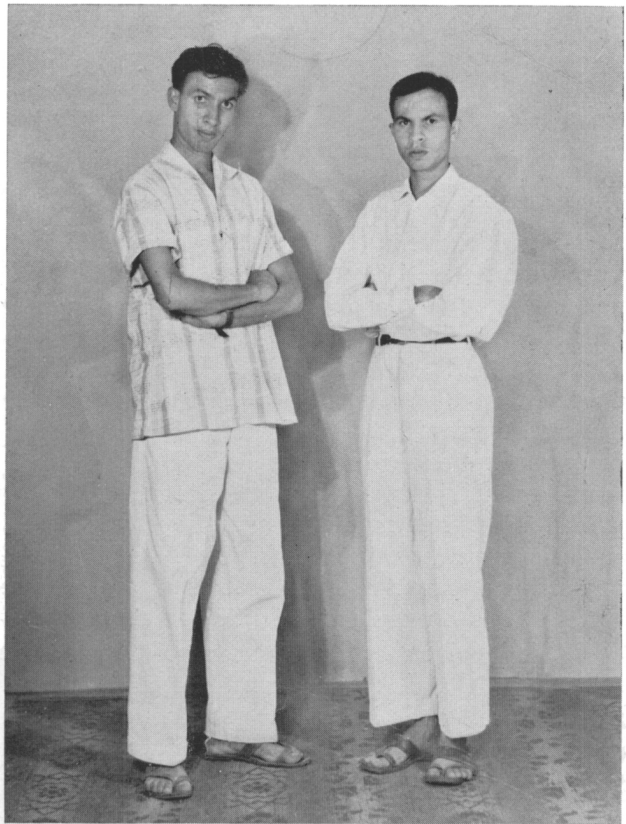
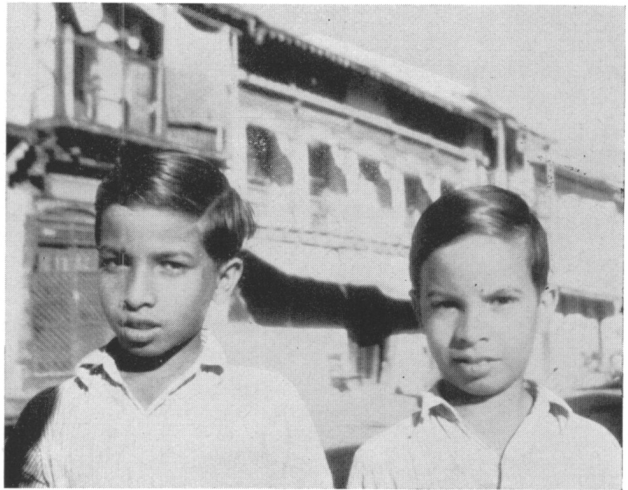


Fig. 4. Srivastava brothers (DZ; 20 yrs.). Brother, born first (left) suffered from typhoid and after two years, has become comparatively taller, robust and hardworking.

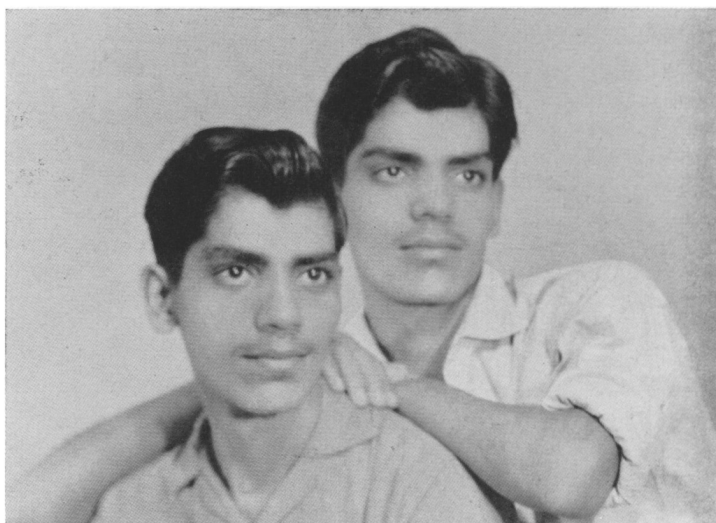


Fig. 5. Narayan brothers (MZ; 17 yrs) from Indore. Both contracted measles simultaneously, in their childhood. Higher degree of concordance is still maintained.

Tab. III. Existence of hereditary factors has already been proved in tuberculosis, (concausal heredity) and measles (Gedda, 1961) as is also evident from the table. For, concordance and sometimes identicalness as to symptomatology can only be explained by postulating an equally controlling genotype in both twins. Out of six MZ pairs who contracted only measles, 5 pairs (both members) contracted it simultaneously and also improved on the same day. Furthermore, both members of 2 MZ pairs also suffered from tuberculosis and measles. Such instances are also recorded for DZ twins but rarely with simultaneous incidence.

Large number of diseases are known to affect normal biochemical functions (De Grouchy, 1958) but none has been shown to influence the physical, mental and anthropometric traits so significantly as typhoid, which has been studied by the "Classic method of observing controls" (Dencker, 1958; Gedda, 1962; WHO, 1966; Goswami, 1967). Tab. III also shows concordance and discordance among 26 MZ and 98 DZ twins. Not much discordance is recorded after the incidence of measles, smallpox, pleurisy and tuberculosis. However, in both types of pairs high degree of discordance was noted in the members of the pairs who suffered from typhoid. These changes in MZ pairs are as follows.

1. Physical traits: Enlargement of facial features (Fig. 1) and better health.
2. Mental traits: (a) Becoming studious, intelligent. This can finally be proved by determining the kinds and amounts of RNAs being synthesized (Hyden and Eghazi, 1964) by cotwins. (b) Smart, prepared to work hard and of dashing attitude.
3. Anthropometric traits. (a) Increase in length of hands and legs with increase in height, and body weight (Figs. 1 and 2).



Data for other diseases and their effects have not been conclusive.

In DZ pairs obvious discordance (Fig. 3) seems to be enhanced by the typhoid incidence when a cotwin becomes much stouter and taller than the normal cotwin (Fig. 4).

MZ twin pairs who either have had no disease incidence or in which both partners had only contracted measles (Fig. 5) still look like "two peas in a pod".

### Summary

The fact that controls as are maintained in most biological experiments, could even be studied ebulliently in human population, by observing a MZ pair, a member of which is exposed to a certain anomaly and the other acts as control, becomes more vivid and recommended from the present studies. For, they can be directly related to human health and welfare.

Permanent changes due to typhoid incidence in physical, mental and anthropometric traits of a member of MZ twin pair may be suggestive of some "beneficial interaction of typhoid bacillus with certain intricate mechanisms like RNA and protein synthesis, as has been envisaged earlier.

### Acknowledgements

I am grateful to Dr. Y. M. Upadhaya (Indore), Shri S. D. Jayakar (Bhubaneswar) and Professor L. S. Penrose F. R. S. (London), for their valuable guidance and encouragement. Thanks are also due to Dr. N. M. Saxena (R.M.O., T.B. Clinic Indore), Dr. Mainker (Maternity Clinic, Indore), many doctor friends, colleagues and students for their manifold help.

But without the generous help offered by Dr. R. L. Kirk (Geneva), Professor Luigi Gedda (Rome), Professor Inouye (Tokyo), the work would not have progressed. I feel highly indebted to them.

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#### RIASSUNTO

Viene sottolineata la possibilità di utilizzare controlli, così come nella maggior parte degli esperimenti biologici, anche negli studi sull'uomo, facendo uso di coppie di gemelli MZ di cui un membro sia affetto da una data malattia e l'altro serva da controllo.

#### RÉSUMÉ

L'Auteur souligne la possibilité d'utiliser des contrôles, ainsi que dans la majorité des expériences biologiques, aussi bien dans les études humaines, moyennant des couples de jumeaux MZ, dont l'un atteint d'une certaine maladie, son partenaire pouvant être utilisé comme contrôle.

#### ZUSAMMENFASSUNG

Verf. betont die Möglichkeit, auch bei Untersuchungen mit Menschen, so wie bei den meisten Tierexperimenten, Kontrollen zu verwenden in Form von EZ-Paaren, von denen ein Paarling von einer gewissen Krankheit befallen ist, während der andere als Kontrolle dient.