

Family Studies in Leprosy¹

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It has been argued (³) that if genetic factors are of importance in the determination of the form of leprosy, within multicase families there should be higher concordance for the type of leprosy than random expectation. This possibility has therefore been investigated.

METHODS

The data used were collected in 1964 from the records of a detailed village survey that had been in progress in the area around Karigiri, near Vellore, South India, since 1962 under Dr. Susan Eapen. The object of this survey had been the screening for leprosy of all inhabitants of every house in each village in the area. All subjects were examined by Dr. Eapen, who made a clinical classification of cases of leprosy into lepromatous, tuberculoid, dimorphous (borderline) or indeterminate types. The recording of family relationships was incidental to this work, so that members of the family not living in the same house were not considered. At the time of classification Dr. Eapen had no knowledge of the present enquiry, and so bias in classification is unlikely.

On the basis of first degree relationships, 84 multicase families were found.

RESULTS

In each family the index case was taken as the parent (53 cases) or the eldest sib (31 cases). Table 1 shows the classification of types of leprosy among relatives according to the classification of index cases.

When the distribution of types was considered as a 3 x 3 table, no significant variation was apparent between relatives of *propositi*, i.e., the individuals through whom the investigation of pedigrees was begun with different types of leprosy. ($\chi^2 = 4.8$; $P > 0.1$.) The χ^2 test is not entirely satisfactory for these results, since two of the cells have expected values of less than 6; however this error would tend to increase the significance rather than reduce it. There is some suggestion of increased numbers of dimorphous cases among the relatives of dimorphous index cases. This may have been due to the inclusion of indeterminate cases in both of these groups.

The distribution of types of leprosy in the relatives is probably more nearly representative of the general population than that of the index cases, as the latter might be expected to show an excess of infectious forms of the disease. Therefore from Table 1 the expected number of concordant pairs is 31/90, i.e., 33 per cent. The number concordant in this series was 38 out of 90, i.e., 42 per cent.

If the first degree relationships are split into parent/child and sib/sib categories, neither shows concordance for type of leprosy significantly higher than random expectation (Table 2).

If these results are considered in relation to sex, no increased concordance is shown between relatives of the same sex (Table 3).

DISCUSSION

Spickett (³) has pointed out that if genetic factors in the host were important in

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TABLE 1. Classification of type of leprosy in relatives according to type in index case.

	Lepromatous	Dimorphous (borderline)	Tuberculoid				
Propositus	33	20	31				
Ist degree relatives in survey	101	67	133				
Ist degree relatives with leprosy.	37	20	33				
	Ist degree relatives with leprosy						
	Observed	Expected	Observed	Expected	Observed	Expected	Total
Lepromatous	11	8.2	2	4.4	7	7.3	20
Dimorphous (borderline)	6	7.8	7	4.2	6	7.0	19
Tuberculoid	20	20.9	11	11.3	20	18.7	51
Totals	37		20		33		90

TABLE 2. Concordance for types of leprosy in first degree relationships.

	Concordant	Not concordant	% concordant
Parent/child	22	33	40
Sib/sib	16	20	45

$$\chi^2_1 = 0.18, P > 0.1$$

TABLE 3. Concordance of type of leprosy according to sex of first degree relatives.

	Parent/child		Sib/sib	
	Same sex	Different sex	Same sex	Different sex
Concordant	13	9	10	6
Not concordant	14	19	13	7

$$\chi^2_1 = 1.44; P > 0.1$$

$$\chi^2_1 = 0.02; P > 0.1$$

the epidemiology of leprosy, one would expect a higher concordance for type of leprosy in related individuals than random expectation. Such a finding does not, however, differentiate an effect of host genotype from environmental factors, which tend to be characteristic of the family

group, such as food habits and hygiene. Nor does it differentiate between the effects of the genotypes of host and pathogen, as the chance of intrafamilial contact is probably greater than extrafamilial contact in areas of average incidence (0.1-1.0%).

The failure to find higher concordance in the present investigation may be thought to suggest that genetic factors in man are not the primary cause of the different manifestations of leprosy. Genetic factors in the pathogen are not excluded, as in an area with a high incidence of leprosy (2-3%) the chances of extrafamilial contact are greatly increased. In the locality from which the sample was drawn the living conditions were remarkably uniform. The distribution of the different forms of leprosy was roughly the same for each village, which is suggestive of uniformity of the factors acting to produce variation in the form of leprosy.

It appears, therefore, that the course the disease takes is probably the resultant of the effects of environment and the pathogen, and that the genotype of the host is of relatively little importance. In this finding we differ from Dungal and Spickett⁽¹⁾ who found evidence in a retrospective survey for concordance between relatives of index cases. Mohamed Ali and Ramanu-

jam (²) have shown in a small series of twins a high concordance for type of leprosy in monozygous twins, but a much lower concordance in the dizygous group. This evidence suggests that a genetic element may be present in the determination of type of leprosy, although no definite conclusions can be based on such very small series. It is clear that further studies investigating the pattern of leprosy within multi-case families, and the study of twins, are necessary before the importance of genetic factors in the determination of type of leprosy can be gauged correctly.

SUMMARY

Study of the distribution of type of leprosy in 84 multicase families showed that concordance for type of leprosy was not significantly increased over random expectation. This finding suggests that the genotype of the host is probably of little importance in determination of the type of leprosy appearing clinically.

RESUMEN

El estudio de la distribución del tipo de lepra en 84 familias con muchos casos, demostró que la concordancia para el tipo de lepra, no aumentaba significativamente, en una muestra al azar. Este hallazgo sugiere que el genotipo del huésped es probablemente de poca importancia en la determinación del tipo de lepra clínico.

RÉSUMÉ

L'étude de la distribution du type de lèpre dans 84 familles comprenant des cas multiples a montré que la concordance du type de lèpre n'était pas significativement plus élevée que ce à quoi le hasard permet de s'attendre. Cette observation suggère que le génotype de l'hôte est probablement de peu d'importance pour la détermination du type de lèpre tel qu'il apparaît cliniquement.

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