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An Anthropo-Genetic Study of Primary (Idiopathic) Generalised Epilepsy with Special Reference to Finger-Ball Dermatoglyphics

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INTRODUCTION

Epilepsy is called primary (idiopathic) when no definite abnormality of the brain or the disorder of the bodily system can be found. It does not indicate any special disease but simply exhibits a seizure clinically. The seizure is known as generalised when the neuronal discharge affects both the hemispheres of the brain of the patients. Therefore, in primary (idiopathic) generalised epilepsy the seizures themselves constitute the disease and no underlying pathological condition can be identified even after thorough and available investigations (Southerland and Eadie, 1980; Shorvon, 1988).

However, for many years several physicians considered epilepsy as a hereditary disorder. Nevertheless, after reading the earlier and some of the current literature one is apt to conclude that there were two opposing schools and they were popularly known as Lennox and Alstrom School. The Lennox School convinced that heredity plays a major role in epilepsy, whereas the Alstrom School equally convinced that heredity plays little or no role (Metrakos and Metrakos, 1970). But most of the current literature are showing more and more interest on the study of the genetics of epilepsy and its hereditary tendency. Therefore, an assessment of the genetic contribution in epilepsy is complicated due to heterogeneity of the condition (Metrakos and Metrakos, 1970; Polkey, 1976; Delgado-Escueta et al., 1982, 1989; Maheshwari, 1986; Shorvon 1990). However, the primary (idiopathic) generalised epilepsy have a strong genetic contribution (Dreifuss, 1989; Shorvon, 1990; Gram, 1990).

In India, there are 8 million (1.0%) epileptics which was estimated in a two-day workshop on epilepsy held at All India Institute of Medical Sciences on 29th July, 1990. Among 8 million epileptics 75.0% belong to the age group under 18 years.

MATERIALS AND METHODS

The pedigree data and the bilateral finger-ball prints of 230 patients (Male = 115, Female = 115) of primary (idiopathic) generalised epilepsy with tonic-clonic (TC)/grand mal (GM) seizure were collected for genetic evaluation from the Neurology clinics of different hospitals of Calcutta, West Bengal. The bilateral finger-ball prints of 230 normal individuals (Male = 115, Female = 115) were also collected from Calcutta to be used as the control. The analysis of the finger-ball prints were done by the internationally accepted method as propounded by Cummins and Midlo (1961) with some modifications.

Each patient was examined by registered medical practitioners thoroughly with the help of the proper clinical evaluations and neurodiagnostic procedures (Osborn, 1979; MacGillivray, 1987; Swash, 1989).

The patients of primary (idiopathic) generalised epilepsy were selected according to the following criteria:

A. The patients were suffering from the primary (idiopathic) generalised epilepsy with tonic-clonic (TC)/grand mal (GM) seizure.
B. The patients had the complain of having a number of recurrent attacks (generally more than one) of the epileptic seizure with loss of consciousness.
C. The patients had their first attack of the epileptic seizure either in their chilhood (4-12 years) or in their adolescence (13-18 years).

Basic Criteria for Selection of the Control

The normal individuals (Males and Females) were selected to be used as the control according to the following criteria:

A. The normal males and the females were selected according to the corresponding caste groups of the male and the female patients.

B. The normal males and the females of any age-group were selected.
C. The close relatives (consanguineous kins) of an individual, who was selected for the control, were avoided.
D. Whenever a family or an individual, irrespective of sex, exhibited the presence of any genetic desease, the family members in both the cases were avoided.

The patients and the normal control of both the sexes were belonging to different corresponding caste groups. Moreover, in West Bengal, the finger-ball dermatoglyphics of different caste-groups generally exhibited statistically non-significant differences between them (Banerjee and Banerjee, 1975). Therefore, the normal control of males and females were pooled together and also the patients of both the sexes, irrespecitve of their castes, in order to compare them statistically.

There were total 230 pedigrees of the primary (idiopathic) generalised epileptic patients with tonic-clonic (TC)/grand mal (GM) seizure (Male = 115, Female = 115) but only 37 pedigrees (Male = 23, Female = 14) out of the total number showed the disorder in single or couple of relatives other than the patients (proband). However, only 10 typical pedigrees, (Male=5, Female=5), out of 37 positive pedigrees, are discussed here (Pedigree-1M to Pedigree-10F).

RESULTS AND DISCUSSION

Pedigree - 1M:

A male patient's (proband) maternal aunt (Mother's sister) was affected by the primary epilepsy (Fig. 1).

Pedigree - 2M:

A male patient's (proband) maternal cousin (Mother's sister's daughter) was affected by the primary epilepsy (Fig. 2).

Pedigree - 3M:

A male patient's (proband) paternal cousin's daughter (Father's brother's daughter's daughter) was affected by the primary epilepsy (Fig. 3).

Pedigree - 4M:

A male patient's (proband) paternal cousin (Father's brother's daughter) was affected by the primary epilepsy (Fig. 4).

Pedigree - 5M:

A male patient's (proband) paternal uncle (Father's brother was affected by the primary epilepsy (Fig. 5).

Pedigree - 6F:

A female patient's (proband) father and paternal aunt (Father's sister) were affected by the primary epilepsy (Fig. 6).

Pedigree - 7F:

A female patient's (proband) niece (sister's daughter) and maternal grandfather (Mother's father) were affected by the primary epilepsy (Fig. 7).

Pedigree - 8F:

A female patient's (proband) paternal cousin (Father's sister's daughter) was affected by the primary epilepsy (Fig. 8).

Pedigree - 9F:

A female patient's (proband) paternal cousin (Father's brother's daughter) was affected by the primary epilepsy (Fig. 9).

Pedigree - 10F:

A female patient's (proband) maternal aunt (Mother's sister) was affected by the primary epilepsy (Fig. 10).

After reviewing the results of 37 positive pedigrees, which showed the disorder in a single or couple of relatives other than the patients, it is observed that the primary (idiopathic) generalised epilepsy does not follow a simple mode of inheritance but at the same time, the idea of the inheritance pattern of autosomal dominant with variable penetrance can not be ruled out.

In the male epileptic patients, loop (58.89%) was predominant (specially in the right hand (57.22%) and in the female epileptic patients, whorl (42.95%) was predominant (in both the hands (R=45.39% and L=40.52%) as compared to their respective control (Fig. 11). But in the total epileptic patients (Male+Female), whorl (41.78%) was predominant as compared to the (36.96%) total normal control (Male+Female) (Fig. 12).

Applying the χ^2-test on the basis of W-L-A pattern-type the male patients and the female patients exhibited statistically significant differences as compared to their respective normal controls. Similarly the total patients also showed a highly significant difference as compared to their normal control.

While the *t*-tests were performed through the total finger ridge count (TFRC), the sig-

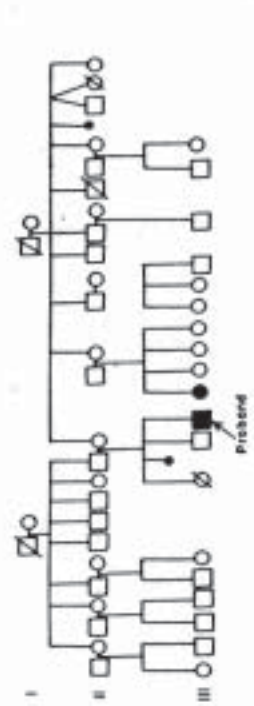

Fig. 2. Pedigree - 2M

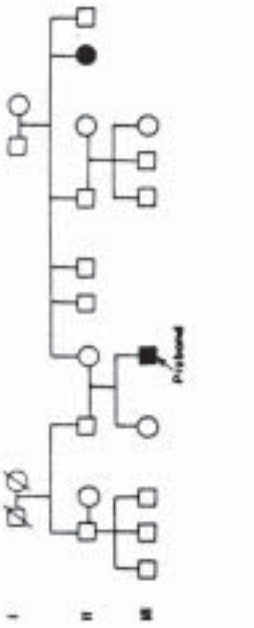

Fig. 1. Pedigree - 1M

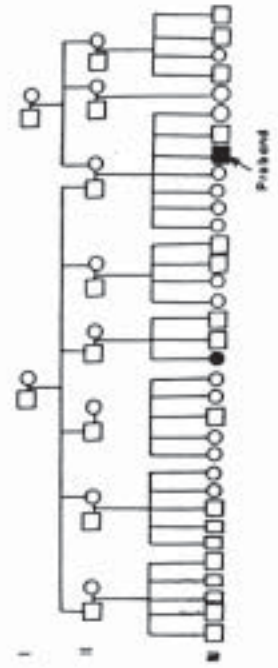

Fig. 4. Pedigree - 4M

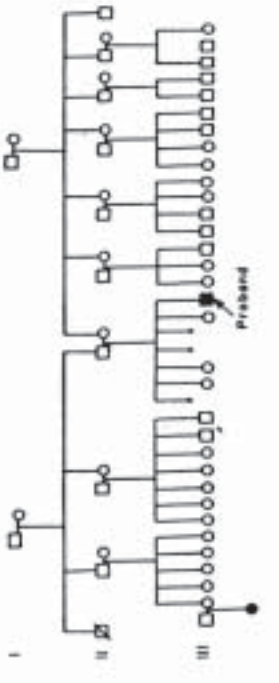

Fig. 3. Pedigree - 3M

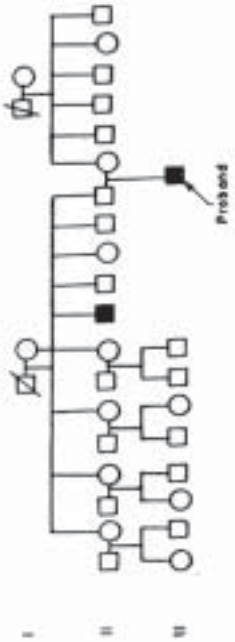

Fig. 5. Pedigree - 5M

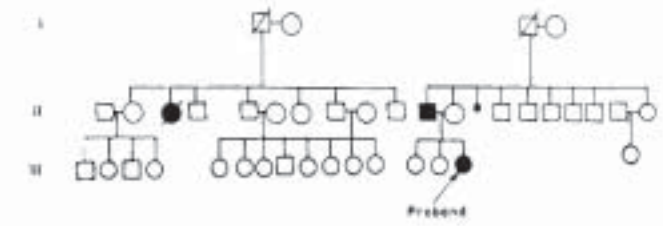

Fig. 6. Pedigree - 6F

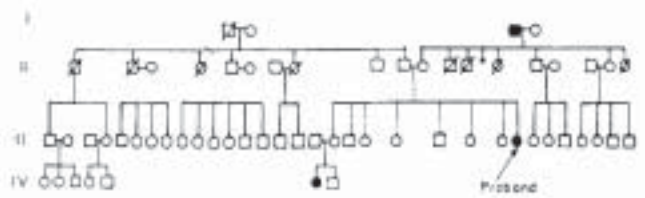

Fig. 7. Pedigree - 7F

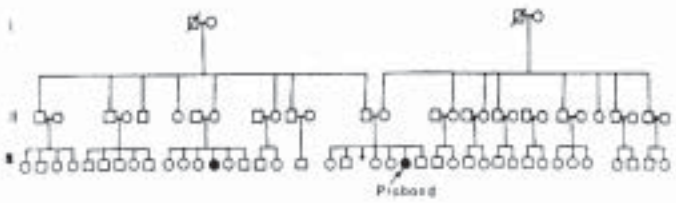

Fig. 8. Pedigree - 8F

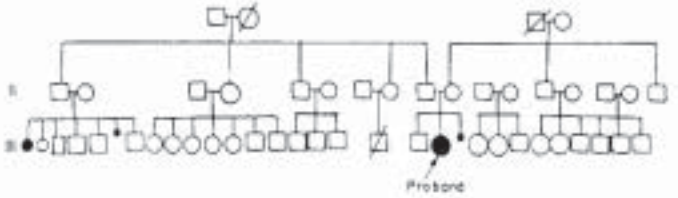

Fig. 9. Pedigree - 9F

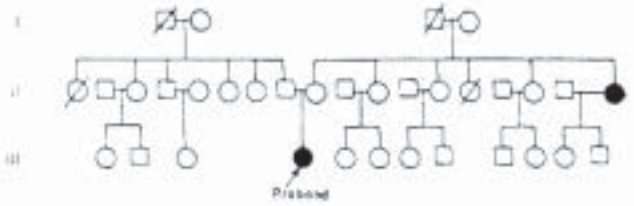

Fig. 10. Pedigree - 10F

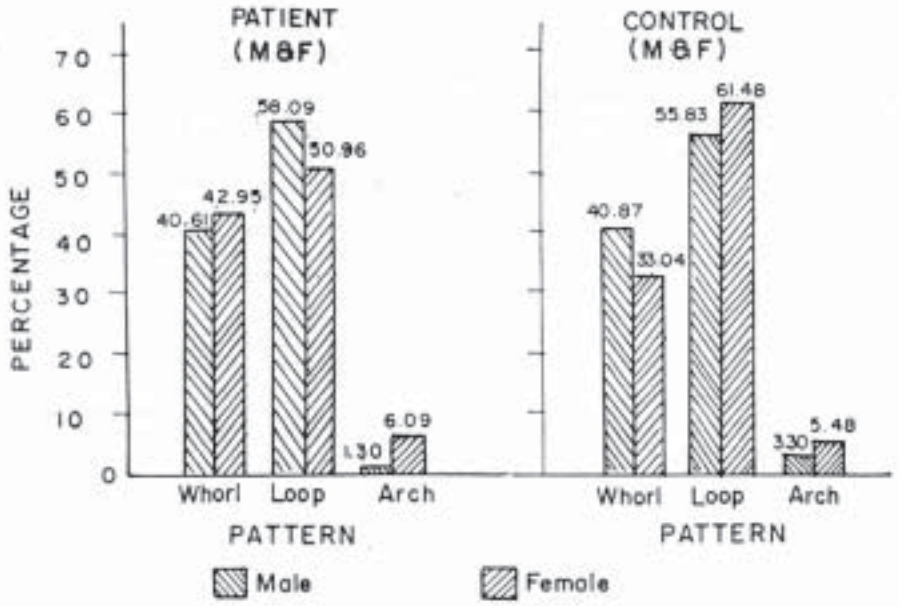

Fig. 11. Distribution of finger ball patterns among male and female patient and control groups.

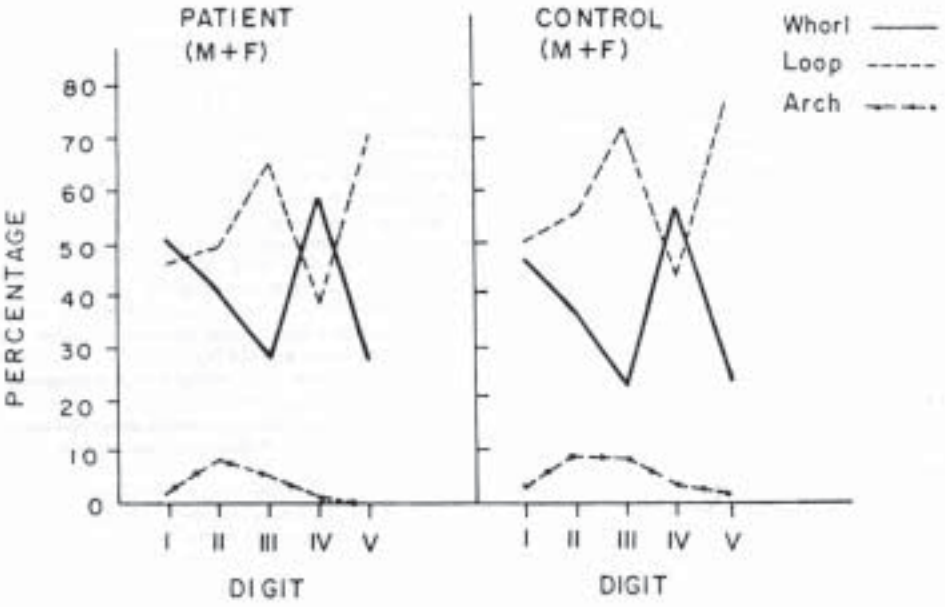

Fig. 12. Distribution of finger ball patterns among male and female combined patient and control groups.

nificant results were observed between the patients and the controls. The total patients (Male+Female) and the total normal control (Male+Female), and the female, patients and the female normal control exhibited statistically significant differences. But the non-significant differences between the male patients and the male control could be a chance.

On the basis of both the χ^2-tests and the *t*-tests, a heterogeneity was observed between the epileptic patients and the normal controls. This heterogeneity may be attributed to the possible cause of epilepsy whose probable genetic nature was established through the pedigree analyses. In other words, the primary (idiopathic) generalised epilepsy probably has an effect on the finger-ball dermatoglyphics.

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KEY WORDS Epilepsy. Idiopathic. Generalised Seizure. Tonic-Clonic. Neuronal Discharge. Dermatoglyphics.

ABSTRACT The primary (idiopathic) generalised epilepsy shows a unique finger-ball patterns. Among the male epileptic patients loop was predominant, whereas among the female epiletic patients whorl was predominant as compared to their respective control groups. However, in total epileptic patients (Male+Female) whorl was predominant as compared to the total normal control (Male+Female). 37 pedigrees showed the disorder in a single or couple of relatives other than the patients. Besides it, both the χ^2-tests and the *t*-tests exhibited heterogeneity between the epileptic patients and the normal control. This heterogeneity may be attributed to the possible cause of epilepsy.

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