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An Electro-Encephalic Approach to the Etiological Background of Hyperkinetic Syndrome in Children

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ABSTRACT

52 children of both sexes, diagnosed as 'Hyperkinetic Syndrome', and a control group of 20 normal children of the same age and sex were randomly selected from paediatric out-patient clinic. Hyperkinetic children were regrouped according to EEG findings : those who showed no abnormalities in EEG, group A (55.8%), and those who express various forms of abnormalities, group B (44.2%). Only 18 control children, those with no abnormalities in EEG, represented group C.

In group A, we observed over- representation of psychogenic stress factors in 62.1%, and neurotic disturbances in early childhood (55.2%). There was a wealth of psychiatric history in the family, especially sociopathy, hyperkinesis and addiction. In group B, we observed over-representation of pathological delivery (34.8%), pathological pregnancy (26.1%) and prematurity. There were associated epileptic disorders in 43.8% and minor physical abnormalities in 30.4%. Soft sign examination revealed positive findings in 74.8% of cases. These findings suggest that hyperkinetic syndrome may be reclassified into distinct psychogenic and organic subcategories.

INTRODUCTION :

Hyperkinetic syndrome is one of the most prevalent behaviour disorders among children. Its frequency of occurrence has been estimated between 4 to 10 per cent of all children (Stewart **et al.,** 1966). However, the prevalence of this syndrome varies greatly with the diagnostic criteria employed, methods of investigation, and population studied. Generally, boys are over-represented in all studies with a boy/girl ratio ranging from 4 : 1 to 9 : 1 (Omenn, 1973). One of the most important variables which affect the prevalence of this syndrome is the confusing terminology and vague definitions applied in its description. Terms such as brain damage syndrome (Strauss and Lehtinen, 1947); minimal brain damage (Gesell and Amatruda, 1949); minimal brain dysfunction (Clements, 1966) and attention deficit disorder (DSM III, 1980) are often used synonymously with the term hyperkinetic syndrome. This syndrome was first described by the German psychiatrist Heinrich Hoffmann more than 100 years ago (Hoffmann, 1854). In this work, we revert to the original term considered by Hoffmann. Essentially there is a symptom pattern of hyperactivity, impulsivity, distractability and excitability, i.e. low frustration tolerance and a tendency to become over-excited and more active in stimulating situations (Stewart **et al.,** 1966).

Controversy continues as regards the most appropriate diagnostic term and subgrouping for hyperkinetic syndrome. Ross and Ross (1976) stated: " There are many statements in the literature accompanied by extensive research evidence that support the view that hyperactivity is a nonspecific symptom occurring in a variety of medical and behavioural disorders and associated with heterogeneous group of etiological factors". Many authors (Tarjan **et al.,** 1972; Ney, 1974; Rutter **et al.,** 1975) suggested multiaxial classification. We think that the old term "hyperkinetic syndrome" with no implication for etiology can be applied more aptly to this diagnostic category, instead of the well known term "minimal brain dysfunction" or the relatively recent term of the DSM III (1980) – "attention deficit disorder".

The aim of this work is to open a new avenue to the possible etiology of such disorder, according to EEG findings.

MATERIAL AND METHOD :

52 children – of both sexes, at an age 6–12 years and diagnosed as "hyperkinetic syndrome" according to the criteria considered by Stewart **et al.,** 1966) – were randomly selected from the paediatric out-patient clinic over the years 1981 and 1982. A control group consisted of 20 normal children, randomly selected from a nearby primary school. We divided our sample into 2 subgroups according to EEG findings :

Subgroup A : Composed of patients with normal EEG findings.

Subgroup B : Composed of patients showing abnormal EEG findings.

Of our control group, two children manifested positive findings in EEG, and were, therefore, excluded. So the present control group (C) was represented by 18 children only.

All groups were studied along the following lines :

1 – Complete physical (including neurological) and psychological examination.

2 – Developmental history.

3 – Neurological examination of soft signs. We selected 5 only from the 12 signs described by Haller and Axlrod (1975). Chosen signs are : Finger – nose test, Moving object test, Out-streched arms test, Undressing and dressing test and Letter – tracing test.

4 – Family history.

RESULTS

1 – Age and sex distribution :

As shown in Table (1), the age and sex distributions of both hyperkinetic and control groups are similar; the boy/girl ratio is roughly 5 : 1.

TABLE I

Age and Sex Distribution

	Sex				Age in Year	
	M.		F.			
	No.	%	No.	%	Yrs.	S.D.
Hyperkinetic children (52)	43	82.7	9	17.3	7.1	2.1
Controls (20)	17	85	3	15	8.1	2.3

2 – Electroencephalic findings :

As shown in Table (2), of the hyperkinetic group : 55.8% showed no pathological findings on EEG report and those represent group A. The remaining 44.2% showed various forms of abnormalities in EEG and were labeled as group B. In the control group (group C), 2 children manifested abnormal findings in EEG.

TABLE II

EEG Findings

	Normal		Abnormal							
			General. Slowing		Paroxys. Discharge		Frequent. Imm.Spik.		Occas. Imm.Spik.	
	No	%	No	%	No	%	No	%	No	%
Hyperkinetic children	29	55.8	16	30.8	4	7.7	2	3.8	1	1.9
Controls	18	90	0	0.0	1	5	0	0.0	1	5

3 – **Developmental History :**

TABLE III

Developmental History

	A		B		C	
	No	%	No	%	No	%
– Prematurity	2	6.9	5*	21.7	–	0
– Pathological pregnancy	3	10.3	6*	26.1	1	5.6
– Pathological delivery	5	17.2	8*	34.8	1	5.6
– Post-natal infection	2	6.9	4	17.4	1	5.6
– Post-natal trauma	4	13.8	3	13	2	11.1
– Psychogenic stresses	18**	62.1	2	8.7	1	5.6

* $P < 0.01$

** $P < 0.005$

In group "A"; psychogenic stresses were over-represented (62.1%). In group "B"; pathological delivery (34.8%); followed by pathological pregnancy (26.1%), then prematurity (21.7%), headed the important observations regarding developmental history.

4 – **Associated Disorders :**

TABLE IV

Associated Physical and Neuropsychiatric Disorders

	A		B		C	
	No	%	No	%	No	%
– Mental retardation	2	6.9	2	26.1	1	5.6
– Epilepsy	1	4.3	8**	34.8	–	0
– Depression	5	17.2	–	0	–	0
– Other neuroses	16**	55.2	–	0	–	0
– Psychoses	–	0	2	8.7	2	11.1
– Neurological disorders	–	0	–	0	–	0
– Physical disorders	–	0	–	0	–	0
– Minor physical anomalies	2	6.9	7*	30.4	–	0

*P. < 0.01.

**P. < 0.005.

In group A, neurotic disturbances and in group B minor physical anomalies were statistically over-represented, 55.2% and 30.4% respectively.

5 – Soft Signs :

TABLE V

Soft Neurological Signs in Hyperkinetic Children and Controls.

	A.		B.		C.	
	N	%	N	%	N	%
- Finger – Nose test	1	3.4	16	29.6	–	–
– Moving object test	5	17.2	12	52.2	1	5.6
– Outstretched arms test	3	10.3	18	78.3	–	–
– Undressing and dressing	5	17.2	19	82.6	1	5.5
– Letter-tracing test	7	24.1	21	91.3	2	11.1
Mean/per cent	4.2	14.4	17.2	74.8	0.8	4.5

The study of these tests showed that a mean of 74.8% in group B showed positive results; compared with 14.4% in group A and 4.5% in group C. This denotes marked cerebral and cerebellar incoordination in group B than in groups A and C.

6 – Family History :

a – Father's side :

In group A, there was over-representation to a statistically significant value in sociopathy (62.1%), followed by history of hyperkinesis (44.8%) then addiction (37.9%). History of psychotic disorders is generally highly represented (31%) in this group than in groups B.& C. (8.7% & 11.2% respectively for both groups).

This is to be compared with group B.; in which the representation of different psychiatric disorders is much lower. But, in general, there is over-representation of sociopathy (13٪) and addiction (13٪).

b – Mother's side :

In group A, there is over-representation of hysteria (41.4٪) and affective disorders (27.6٪) to a statistically significant value. Only in 13.8٪ there was history of hyperkinesis.

In group B, much lower values were observed. The greatest representation in this group was in sociopathic history (13٪).

c – Siblings :

In group A, sociopathy was greatly over-represented to a statistically significant value in 41.4٪, followed by history of hyperkinesis in 17.2٪, then addiction (10.3٪). Lower values were observed in group B.

We may conclude that in group A what seems to be of importance from the father's side is a history of sociopathy, hyperkinesis and addiction, while on the mother's side, it is hysteria and affective disorders. There is over- representation of psychoses in general on father's side. In groups B. & C. psychiatric history in nuclear families was of much less significance.

DISCUSSION :

Our study addressed the question of whether a basal EEG record can be used to classify patients with hyperkinetic syndrome, and whether an organic versus a psychogenic background has something to do with classification according to EEG findings.

TABLE VI

Summary of the Important Data Observed in Our Patients

Group	"A"			"B"		
	Observed data	%	Signif.	Observed data	%	Signif.
Developmental History	Psychog. Stress.	62.1	P. < 0.005	Patholog. Pregnancy	26.1	—
				Prematurity	21.7	P. < 0.01
Associated Disorders	Neuroses	55.2	P. < 0.005	Epilepsy	43.8	P. < 0.01
				Minor physical anomalies.	30.4	P. < 0.01
Sof Signs		14.5		Soft Signs	74.8	P. < 0.01
Family History :						
– Father	Sociopathy	62.1	P. < 0.005	—		
	Hyperkinesis.	44.8	P. < 0.01	—		
	Addiction	37.9	P. < 0.01	—		
	Psychoses	31.0		—		
– Mother	Hysteria	41.4	P. < 0.01	—		
	Depression	27.6	P. < 0.01	—		
– Sibs.	Sociopathy	41.4	P. < 0.01	—		

A pathological EEG was found in 44.2% of hyperkinetic children (group B). A normal EEG was found in 55.8% (group A). EEG abnormalities in our study are consistent with most other reports. They disagree with the work of Werry **et al** (1972). EEG abnormalities in our study are mostly non-specific and require future research in order to be clarified further.

In group B, there were significant indicators pointing to a possible organic contribution to these cases. A history of pathological pregnancy, problematic delivery , and prematurity were over-represented. Taken together with the detection of a higher incidence of minor physical anomalies, history of epilepsy, and positive soft neurological signs, these findings point collectively to an organic cerebral insult in these cases.

Many studies have demonstrated organic involvement in the hyperkinetic syndrome. Silver (1952), Bender (1956), Werry (1972), Satterfield (1973), and Millichap (1973) stressed the view that hyper kinetic children showed excess minor neurological signs. Rapoport **et al.** (1974) demonstrated an association between severe hyperkinesis on one hand, and minor physical anomalies, obstetric difficulties at birth, and hyperactivity in the father on the other. They view hyperkinetic children with minor physical anomalies as a distinct subgroup in this syndrome. Kaspar **et al.** (1971) referred to complications of pregnancy and parturition as possible aetiological factors. Anoxia was observed as a possible factor in hyperkinesis in rat pups (Simon and Voleer, 1976; Shaywitz **et al.** 1976). Ounsted (1955) demonstrated an excess of epilepsy in these children.

In group A,environmental stressors and neurotic disturbances in the early years of life were over-represented. A family history of psychiatric disorder, of sociopathy and hyperkinesis, was more prevalent in the same cases. These findings point to one or more of the following possibilities :

a) Psychogenic conflicts as aetiologic factors.

b) A genetic behavioral aberration.

c) The relationship between sociopathic behavior and hyperkinetic syndromes should be studied in future research. Our study demonstrates such an association, but it requires more detailed confirmation and extension. Sociopathic traits could be causative or the result of hyperactivity.

Psychogenic factors were stressed in a number of studies as causative, contributing or perpetuating factors in hyperkinetic syndrome (Thomas and Chess, 1977; Carey and Mc Devitt, 1978; Cox, 1982).

Our work shows that both organic and psychogenic factors underlie the hyperkinetic syndrome. A pathological EEG together with a history of pathological pregnancy, prematurity, epilepsy, minor physical anomalies, and minor neurological signs were associated. Whereas a normal EEG was associated with psychological stressors in the development, neurotic disorders in early life, and an excess family history of psychiatric disorders. The hyperkinetic syndrome may be re-classified into organic and psychogenic categories and EEG may be helpful in some cases to suggest whether the case has a psychogenic or an organic core.

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الموجـــــــز

استخدام تخطيط المخ الكهربائى

لتصنيف المسببات لمرض « زملة النشاط الزائد » فى الأطفال

تم اختبار عينة عشوائية تتكون من ٥٢ طفلا من الجنسين ، بلغ متوسط عمرهم حوالى ٧ر٨ ± ١ر٢ سنة . وتم تقسيمهم حسب نتائج رسم المخ الى مجموعتين :

(أ) المجموعة التى لم يظهر فيها أى تغيرات برســـــم المخ . وبلغ عددهم ٢٩ مريضا .

(ب) المجموعة التى أظهرت تغيرات فى رسم المخ . وشـــملت ٢٣ مريضـــا .

أما المجموعة المقارنة « ج » فتمثلت فى ١٨ طفلا من الأســـــوياء — وقد أجريت الفحوصات الآتية على المجموعات الثلاثة أ ، ب ، ج .

١ — فحص جسمى (يشمل الفحص العصبى) ونفسى شامل .

٢ — تاريخ النمو .

٣ — الاختبارات العصبية المعروفة باســـــم « العلامات العصبية الدقيقة » .

٤ — التاريخ المرضى للأمراض النفسية بالعائلة .

عرضت النتائج ونوقشت حيث أوضحت انه يمكن تقسيم هذا المرض الى مجموعتين ، مجموعة نفسية واخرى عضوية .

ABSTRAIT

Un Abord Electro-encephalique à l'Etiologie du Syndrome Hyperkinétique chez les Enfants.

52 enfants des deux sexes, diagnostiqués comme 'syndrome Hyperkinétique', ainsi qu'un groupe controle de 20 enfants normaux, du même âge et du même sexe, ont été sélectionnés au hazard d'une clinique pédiatrique. Les enfants hyperkinétiques étaient regroupés selon les résultats de l'EEG, ceux qui ont demontré acune anomalie dans l'EEG, groupe A (55,8 %), et ceux qui ont démontré differentes formes d'anomalies, groupe B (44.2 %). 18 enfants du groupe controle n'ayant acune anomalie dans l'EEG représentaient le groupe C.

Dans le groupe A, nous avons observé une sur-représentation des facteurs de tension psychogène chez 62.1 %, ainsi que des affections névrotiques durant les premières années chez 55.2 %. Dans les familles du groupe A étaient surreprésentès la sociopathy, l'hyperkinésie, la toxicomanie.

Dans le groupe B nous avons observé une sur-représentation de l'accouchement pathologique (34,8 %), gestation pathologique, et prématurité. Des troubles épileptiques étaient associés chez 43.8 % et des anomalies physiques mineures chez 30.4 %. Des signes neurologiques discrets ont été trouvés chez 74.8 % des cas de ce groupe. Ces résultats suggérent que le syndrome hyperkinetique pourrait être reclassifié selon une sous-catégorie psychogène et une autre organique.

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Vascular Disturbances and Mental Disorders

By : G. E. Muller

ABSTRACT

From a consecutive series of 257 patients (113 F; 144 M; average age 62,77) 24 were selected for vascular surgery. The series was subdivided into a vascular group (186) and a psychiatric group (71). The relationship between vascular disturbances and organic brain syndromes was examined. Diffuse vascular disturbances seemed to play a role in delirium, multiinfarct dementia and discrete mental disturbances. Basilar insufficiency seemed more important than carotid insufficiency in discrete mental disturbances. Depressions were only associated in about 22% with vascular disturbances. Right carotid disturbances tended to predominate in depressions. Delirium tended to be associated with acute vascular disturbances, depression was more frequently associated with chronic vascular disturbances although we had excluded well established vascular accidents. This is a pilot study and larger numbers of patients must be examined before reaching more definite conclusions.

INTRODUCTION :

In 1980 Barolin from Austria published a series of 200 cerebrovascular accidents of those 30% were associated with depressions. He did not notice any predominant lateralisation but found the CVA in the carotid territories correlated with 27,5% of the depressions as against 44% of the CVA in the basilar territories.