THE HYPERKINETIC SYNDROME:

SOME ASPECTS AS SEEN IN CHILDREN AT

KENYATTA NATIONAL HOSPITAL.

A DISSERTATION SUBMITTED IN PART FULFILMENT

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DEDICATION:

TO: ODHIAMBO, OPIYO AND ODONGO FOR THE SACRIFICE THEY MADE UNKNOWINGLY, AND TO CALLEB FOR NEVER ENDING WORDS OF ENCOURAGEMENT.

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D E C L A R A T I O N:

I hereby certify that this Dissertation is my own original work and has not been presented for a degree in any other University.

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LIST OF ABBREVIATIONS

K.N.H.	KENYATTA NATIONAL HOSPITAL
K.E.M.R.I.	KENYA MEDICAL RESEARCH INSTITUTE
DEPT.	DEPARTMENT
R.S.	RESPIRATORY SYSTEM
P.A.	PAR ABDOMEN
C.V.S.	CARDIOVASCULAR SYSTEM
C.N.S.	CENTRAL NERVOUS SYSTEM
KG	KILOGRAMS
MTHS	MONTHS
NO.	NUMBER
HRS	HOURS
WT	WEIGHT

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SUMMARY

Fifty-four children with the hyperkinetic syndrome were seen in this study. Certain aspects pertaining to them were examined including demographic information, prenatal and perinatal events, developmental and social history and educational experiences. This information was also obtained for 54 controls, and was from mothers who had achieved various levels of formal education.

Majority of these children (51.9%) were between age 5-8 years and 81% of them had onset of illness on or before the age of three years. No prenatal, paranatal or postnatal events had any bearing on the occurrence of the hyperkinetic syndrome in these children except neonatal jaundice which occurred only in 9.48% of affected children ($p < 0.05$). A large number of them, 81.5%, also suffered from epilepsy.

The affected children attained milestones at a mean age which was within normal limits and had no physical defects or gross neurological deficits on examination. They, however, displayed several soft neurological signs each, indicating a severe form of the disorder.

Although a number of children with the hyperkinetic syndrome were of school age, only one of them attended

school sporadically. This was due to his behaviour problems which were unacceptable to his peers and teachers.

INTRODUCTION

The syndrome designated 'The Hyperkinetic Syndrome' was first described by Heinrich Hoffman in 1954 (1). Paediatricians and psychiatrists have known its existence since the 1950s, but it is only in the 1960s that it became of concern.

The syndrome is characterised by inattentiveness, impulsivity, easy distractibility, easy excitability and motor overactivity (2,3,4,5). Affected children have subtle neurological deficits or 'soft neurological signs', that may not be evident during the usual physical examination when no physical abnormalities are found, usually, and they usually have normal milestones. The disorder has its onset early in childhood and occurs in children with minimal brain damage or dysfunction, poorly controlled epilepsies and in some children on phenobarbitone therapy. It leads to problems of interpersonal relationships from childhood, and throughout adolescence and adulthood. Aggression and antisocial behaviour may arise from this, and in one study by Scatterfield, Hoppe and Schell (6) 36-55% of hyperactive children were arrested, later on in life, for various offences, as compared to 2-11% of controls.

Opinion varies as to the origin of the hyperkinetic syndrome which was originally thought to occur only

in children with minimal brain dysfunction. More recently, evidence suggests a biochemical basis for it, and attention deficit is now thought to be the primary disorder underlying the syndrome (3,7,8,9,10). The hyperkinetic syndrome has been associated with genetic and gestational hazards, prematurity, anoxia and other complications of birth (2,11,12,13,14). Some, such as genetic hazards, were disputed by Warren and other workers (15) who found normal chromosomal patterns in the patients they studied. Other, such as abnormalities in the central nervous system, neurotransmitters like serotonin, were found to reduced in the blood of hyperkinetic children by Coleman (9), but its metabolites in urine were found to be within normal limits by Wender (10) in another study. The neurotransmitter theory has been difficult to prove due to inability of obtaining measurements of the neurotransmitter levels within the brain. Dubey (13), in his review, suggested that this theory is based on the fact that children with hyperkinesis respond to stimulant drugs, that themselves have an effect on central nervous system neurotransmitters.

Environmental factors have also been quoted in the causation of the hyperkinetic syndrome. Dubey (13) quoted one worker as having diagnosed the hyperkinetic syndrome in a few children coming from impoverished city areas with features of lead poisoning. Feingold (16) postulated the famous theory that hyperkinesis

and learning disorders were somehow linked to artificial food flavourings and colourings. He carried out a study that showed improvement in the symptoms of affected children when these artificial additives were excluded from their diet. However, this was later refuted by Mates and Gittelman (17), who found no significant changes in the behaviour of the children they saw in a similar study.

Hughes (18) suggested that the hyperkinetic syndrome is a hypersensitivity-like disorder, as a result of which he gave the affected children he studied a bland, "non-allergic" diet with positive results.

The causes of the hyperkinetic syndrome are yet to be determined. Evidence to support a specific association between it and a demonstrable insult to the brain is inadequate despite several studies. These studies have been carried out extensively in the developed nations. There is negligible evidence that it has been studied in the developing nations and in Kenya, there are only occassional case reports (19) indicating neglect in the field of child psychiatry.

It was this background of uncertainty of the causes of hyperkinetic syndrome, and in particular, an interest in child psychiatry in general, that prompted this study.

AIMS AND OBJECTIVES

AIM: To study some aspects of the hyperkinetic syndrome in children at Kenyatta National Hospital.

OBJECTIVES:

1) To determine predisposing factors associated with the hyperkinetic syndrome in children between one & twelve years of age.

2) To study the pattern of presentation of soft neurological signs in these children.

MATERIALS AND METHODS

This was a case controlled study carried out at the Kenyatta National Hospital (KNH) - teaching and referral hospital, Nairobi, Kenya - from December 1986 to August 1987.

All of the children in this study including controls, were either living within Nairobi or were from other nearby districts surrounding Nairobi, such as Kiambu and Machakos. They were referred to KNH from health centres within Nairobi, or from the provincial or district hospitals from which they came. The children with the hyperkinetic syndrome were subsequently referred to the psychiatry or neurology consultant clinics for further management. After review by the consultants, the patients were referred to the author on Tuesday afternoons. Patients who had been seen by the consultants before this study begun and were on follow up were also referred to the author on Tuesday afternoons.

Selection of patients and controls

The author requested that all hyperactive children be referred to the neurology clinic on Tuesday afternoons. However, only those satisfying the inclusion criteria in the Diagnostic and Statistics Manual (DSM III) of the American Psychiatry Association (APPENDIX 1) (20) were included in the study. These included impulsivity,

inattention, hyperactivity, illness of onset before the age of seven years and duration of illness of at least six months. In addition, only patients accompanied by mothers and who were not on phenobarbitone therapy were included.

Controls were selected from the paediatric filter clinic, and included those attending the clinic for minor ailments and who were not themselves hyperactive. They, too, had to be accompanied by their mothers and were matched for age and sex to the children with the hyperkinetic syndrome.

Exclusion Criteria

These applied to both patients and controls and again were to be found in the DSM-III, and were children found to be having profound mental retardation, disorders of sensory organs and pervasive developmental disorders.

Collection of Data

A questionnaire (Appendix 2) was filled for each child after obtaining informed consent from the mother. The information filled in each questionnaire included demographic information, genetic background, prenatal and perinatal events, developmental and social history and educational experiences. Also in the questionnaire was information on a complete physical examination with

emphasis on the neurological status of each child including the head circumference. This was taken as that circumference obtained when a tapemeasure was applied firmly over the glabella and supraorbital ridges and occiput posteriorly that gave maximum circumference.

The children were then examined for 15 neurological signs adapted from the study by Gilbert and Rasmussen (21), which pertained to attention, motor and conduct problems.

A second questionnaire (Appendix 3) was filled by class teachers or patients attending school, to obtain information concerning behaviour and general academic performance of these patients.

DATA ANALYSIS

This was done using the above questionnaire. Significance tests using x^2 and student T-tests were performed where necessary and p-levels < 0.05 taken to be significant.

RESULTS

A total number of 54 patients and 54 controls were included in this study.

Tables 1a) and b) show the age and sex distribution for patients and controls respectively. For both groups, the ages of the children ranged from 3-11 years with the majority (51.9%) in the range of 5-8 years. There were a total of 35(64.8%) males and 19(35.2%) females in each group, indicating a male preponderance and a male to female ratio of 1.8:1. There was no significant difference, between the males and females in the various age groups, (x^2 = 0.0586979; $p > 0.05$) and thus they were considered together in analysis.

Table 1a): Distribution of patients by age and sex

AGE (YRS)	MALE	FEMALE	TOTAL	%
⩽ 4	13	8	21	39
5-8	18	10	28	51.9
9-12	4	1	5	9.2
TOTAL	35	19	54	100.1
%	64.8	35.2	100	-

Table 1b): Distribution of controls by age and sex

AGE (YRS)	MALE	FEMALE	TOTAL	%
⩽ 4	13	8	21	39
5-8	18	10	28	51.9
9-12	4	1	5	9.2
TOTAL	35	19	54	100.1
%	64.8	35.2	100	-

The distribution of controls was similar to that of the patients.

Onset of illness

The onset of symptoms of the hyperkinetic syndrome in the patients is in table 2. Fourty four of the patients (81.5%) began showing symptoms on or before the age of three years. The rest (18.5%) showed symptoms between four and six years of age.

There was no significant difference in the age of onset between males and females ($x^2 = 0.1247573$; $p > 0.05$). The average age of onset was 2.4 years.

Table 2: Age at onset of symptoms in relation to sex.

AGE (YRS)	MALE	FEMALE	TOTAL	%
$\leqslant$ 3	29	15	44	81.5
4-6	6	4	10	18.5
TOTAL	35	19	54	100
AVERAGE	-	-	2.4	-

Maternal Level of Education

The majority of mothers were educated; 50(92.6%) of mothers of patients and 48(88.9%) of mothers of controls. However, as is shown in table 3, there was a significant difference in the proportions who attained the various levels of education ($x^2 = 18.5$; $p < 0.001$). The majority of the mothers of the patients, 29(53.7%) only attained primary education and none of them atttended university, whereas 9(16.7%) of the mothers of the controls attained university education and their majority (51.6%) had secondary education.

Table 3: Level of education of mothers of Patients (54) and Controls (54)

		GROUP A		GROUP B	
LEVEL OF EDUCATION		TOTAL	%	TOTAL	%
PRIMARY SCHOOL	1-4	0	0	1	1.9
	5-8	29	53.7	10	18.5
SECONDARY SCHOOL	1-4	18	33.3	27	50.0
	5-6	3	7.4	1	1.9
UNIVERSITY		0	0	9	16.7
NIL		4	5.6	6	11.1
TOTAL		54	100	54	100

Ages of Mothers

The ages of the mothers at the time of delivery of patients and controls is shown in table 4. Thirty-three (66.7%) of the mothers of the patients and 45 (83.3%) of the mothers of controls were between 20-29 years of age. However, in this range, the mothers of the patients tended to be younger while those of the controls tended to be older than 25 years of age. There was no significant difference in the mean ages of the mothers between the two groups, ($t=0.13421; p > 0.05$).

Table 4: Ages of mothers at time of birth of patients (n=53) and controls (n=54)

AGE (YRS)	PATIENTS		CONTROLS	
	TOTAL	%	TOTAL	%
15 - 19	8	14.8	4	7.4
20 - 24	23	42.6	16	29.6
25 - 29	13	24.1	29	53.7
30 - 34	6	11.0	3	5.6
35 - 39	2	3.7	2	3.7
40 - 44	1	1.9	0	0
UNKNOWN	1	1.9	0	0
AVERAGE AGE (YRS)	23.2	-	25.9	-

Maternal illnesses

Maternal illnesses in the neonatal period were limited to three mothers of children in the control group. Two of these mothers (3.7%) had hypertension for which they were on antihypertensives and sedation, and one (1.9%) had diabetes mellitus and was on insulin.

Neither the mothers of the patients nor those of the controls somked at all and only 5 (9.4%) of the mothers of the children in the control group admitted to having drank alcohol on and off.

Gestation at birth

Most of the children, 51(94.4%) of patients and 47(87.0%) of controls were born at term as is shown on table 5. There was no significant difference in the mean duration of gestation between the two groups ($t = 1.2505; p > 0.05$).

Table 5: Gestation at birth in patients (n = 54) and controls (n = 54).

GESTATION (MTHS)	PATIENTS		CONTROLS	
	TOTAL	%	TOTAL	%
6	0	0	1	1.9
7	1	1.9	3	5.6
8	2	3.7	3	5.6
9	51	94.4	47	87.0
AVERAGE (MTHS) GESTATION	8.83	-	8.81	-

Place of delivery

The majority of children in this study were born in a health institution, i.e. 46 (85.2%) of the patients and 48 (88.9%) of the controls. This is shown in table 6.

Table 6: Place of delivery in both patients (n = 54) and controls (n = 54).

PLACE OF DELIVERY	PATIENTS		CONTROLS	
	TOTAL	%	TOTAL	%
HOSPITAL	46	85.2	48	88.9
HOME	8	14.8	6	11.1
TOTAL	54	100	54	100

There was no significant difference in place of delivery between the two groups.

$x^2 = 0.32827; p > 0.05$.

Duration of labour

Table 7 shows the duration of labour for patients and controls. Most of the children were born within fourteen hours of commencement of labour; 41(75%) of the patients and 47(87.1%) of controls. Two patients (3.7%) from each group were delivered by elective ceasarian section and a further 2(3.7%) of children in the patient group did not have details of duration of labour. Two children from each group were victims of prolonged labour i.e. 27 and 48 hours and 27 and 40 hours in patient and control groups respectively. The mean duration of labour for the patients was 9.4 hours, while that of the control group was 7.5 hours. There was no significant difference in the mean duration of labour between the two groups ($p > 0.5$).

Mode of delivery

Table 8 shows that most of the children in this study were born by spontaneous vertex delivery. Fourty six (85.2%) out of 54 patients and 48(88.9%) of controls were born by this method. The incidence of vacuum extraction was 3.7% in each group and breech deliveries were found only among the controls. The incidence of ceasarian section was slightly higher among the patients (9.4%) than in the controls (3.7%) but this was not significant ($p > 0.1$).

Table 7: Duration of labour in hours for patients and controls.

DURATION OF LABOUR (HRS)	PATIENTS (n=50)		CONTROLS (n=52)	
	No.	%	No.	%
0 - 4	20	37.04	25	46.33
5 - 9	9	16.67	12	22.22
10 - 14	12	22.22	10	18.52
15 - 19	1	1.85	0	0
20 - 24	6	11.11	3	5.56
25+	2	3.70	2	3.70
UNKNOWN	2	3.70	0	0
ELECTIVE CAESARIAN SECTIONS	2	3.70	2	3.70
AVERAGE DURATION OF LABOUR (HRS)	9.4	-	7.5	-

There was no significant difference in the mean duration of labour between the two groups.

$t = 0.36468$; $p > 0.5$.

Table 8: Mode of delivery of patients and controls.

MODE OF DELIVERY	PATIENTS		CONTROLS		x^2	p
	No.	%	No.	%		
S.V.D.	46	85.2	48	88.9	0.027814	>0.05
V.E.	2	3.7	2	3.7	0.000363	>0.05
C.S.	5	9.4	2	3.7	1.394654	>0.05
BREECH	0	0	2	3.7	-	-
UNKNOWN*	1	1.9	0	0	-	-
TOTAL	54	100	54	100	-	-

KEY: S.V.D. - Spontaneous Vertex Delivery
V.E. - Vacuum Extraction
C.S. - Caesarian Section

There was no significant difference in the mode of delivery between the two groups in all the methods tested; $p > 0.05$.

* Patient was adopted at the age of 2 weeks.

Birthweights

A considerable number of mothers were unable to remember the birthweights of their children. Table 9 shows that, in the patient and control groups respectively, 28.8% and 11.1% of mothers were unable to remember the birthweights of their children and also that some of those children whose weights were not known were not born in hospital. Most of the children, i.e. 51.9% of patients and 66.9% of controls were of normal birth weight. The mean birth-weight was slightly higher for controls but this was not significant ($t = 0.0358; p > 0.5$).

Table 9: Distribution of Birthweights for patients and controls.

BIRTHWEIGHT (GM)	PATIENTS (n=39)		CONTROLS (n=48)	
	No.	%	No.	%
⩽ 1000	0	0	1	1.9
1001-1500	1	1.9	0	0
1501-2000	2	3.7	5	9.4
2001-2500	8	14.7	6	11.1
2501-3000	7	13.0	13	24.1
3001-3500	12	22.2	11	20.4
3501-4000	9	16.7	7	13.0
> 4000	0	0	5	9.4
UNKNOWN	15	28.8	6	11.1
AVERAGE (KGS)	2.9	-	3.02	-

Perinatal Morbidity

The incidence of low birth weight was more or less equal for both patients and controls. In fact, the only disorder which affected the patients more than controls significantly was jaundice. This is shown on table 10.

Table 10: Perinatal Morbidity in Patients and Controls.

TYPE OF MORBIDITY	PATIENTS		CONTROLS		x^2	p
	No.	%	No.	%		
NO ILLNESS	46	86.79	49	90.74	0.7871	>0.05
LOW BIRTH-WEIGHT	11	20.75	12	22.22	0.3414	>0.05
JAUNDICE	5	9.48	0	0	5.3441	<0.02
ASPHYXIA	2	3.70	2	3.70	0.0004	>0.05
PREMATURITY	1	1.89	3	5.56	1.0045	>0.05

Childhood illnesses

The most common childhood illnesses affecting the children with the hyperkinetic syndrome were convulsive disorders which occurred in 81.5% of the patients. Its occurrence, however, did not show a significant difference between the males and females ($x^2 = 1.0761; p > 0.05$), other illnesses were much less common.

Table 11: Frequency of childhood illnesses in the patients.

TYPE OF ILLNESSES	MALE	FEMALE	TOTAL	%
CONVULSIONS	28	16	44	81.5
MENINGITIS/ ENCEPHALITIS	6	4	10	18.5
MILD RETARDATION	4	5	9	16.7
G'ENTERITIS WITH DEHYDRATION	7	0	7	13.0
MALARIA	2	4	6	11.1
MEASLES	1	2	3	5.6
MALNUTRITION	1	2	3	5.6
PNEUMONIA	1	2	3	5.6
TRAUMA	1	0	1	1.9
NONE	2	1	3	5.6

Milestones

Tables 12a)-d) show some gross motor milestones as they were achieved by both patients and controls. They show that the mean ages at which milestones were achieved were within normal limits for both patients and controls. However, they also suggest that the controls are significantly faster.

Table 12a: Ages at which head-control was achieved in patients and controls.

AGE (MTHS)	PATIENTS (n=54)		CONTROLS (n=54)	
	No.	%	No.	%
0-3	23	42.6	32	59.3
4-6	25	46.3	22	40.7
7-9	5	9.3	0	0
10-12	1	1.9	0	0
AVERAGE (MTHS)	4.5	-	3.4	-

The mean age at which the children achieved head control was within normal limits but controls were significantly faster; $t = 3.5614; p < 0.05$.

Table 12b: Ages at which patients and controls sat without support.

AGE (MTHS)	PATIENTS (n=54)		CONTROLS (n=54)	
	No.	%	No.	%
4-6	32	59.3	46	85.2
7-9	17	31.5	8	14.8
10-12	5	9.3	0	0
AVERAGE (MTHS)	6.3	-	4.6	-

Mean age at which children sat with support was within normal but controls were significantly faster.

$t = 2.9338$; $p < 0.05$.

Table 12c: Ages at which patients and controls crawled.

AGE (MTHS)	PATIENTS (n=54)		CONTROLS (n=54)	
	No.	%	No.	%
4-6	12	22.2	20	37.0
7-9	29	53.7	30	55.6
10-12	12	18.5	4	7.4
13-15	3	5.6	0	0
AVERAGE (MTHS)	8.6	-	7.1	-

The children in the control group crawled significantly faster.

$t = 2.9151$; $p < 0.05$.

Table 12d: Ages at which patients and controls walked without support.

AGE (MTHS)	PATIENTS (n=54)		CONTROLS (n=54)	
	No.	%	No.	%
7-9	13	24.1	11	20.4
10-12	12	22.2	24	44.4
13-15	20	30.0	16	29.6
16-18	7	13.0	3	5.6
19-21	2	3.7	0	0
AVERAGE (MTHS)	12.5	-	11.6	-

There was no significant difference in the mean age at which the patients and the controls walked without support. $t = 0.09454$; $p > 0.5$.

Tables 13a) and b) show the frequency of fifteen soft neurological signs that were examined. Those children who had features of the hyperkinetic syndrome were significantly more affected at all times, except when it came to making friends. The children in the control group made friends much more easily. The patients displayed ten or more signs each time compared to 1-3 in the controls indicating that children afflicted with this syndrome in our setting showed signs tending to a more severe disease. A thourough physical examination with emphasis mainly on the neurological examination, however, showed no gross abnormalities in the affected children apart from clumsiness and poor speech articulation. Their head circumference also compaired favourably with those of the children in the control group.

Only one child from the index group attended school. The others had either been sent off by poorly informed teachers, because of their bad behaviour, or they had not yet began school. The children in the control group, apart from two were at various levels in pre-school and primary school institutions.

Table 13a: Frequency distribution for single soft neurological signs in male and female patients

	SIGN	Males	Female	% Males	% Females	X^2	P
1.	Poor Concentration	32	19	91.1	100	1.7244	0.05
2.	Overactive Compaired to other siblings	34	19	97.1	100	0.5750	0.05
3.	Requires Constant Encouragement to complete simple tasks	34	19	97.1	100	0.5750	0.05
4.	Problems remembering simple instructions	28	18	80.0	94.7	2.1192	0.05
5.	Easily Excitable	34	18	97.1	94.7	0.1999	0.05
6.	Conflicts with peers	27	17	77.1	89.5	1.2409	0.05
7.	Intense Emotional Reactions	33	18	94.3	94.7	0.0048	0.05
8.	Destructive	34	17	97.1	89.5	1.3805	0.05
9.	Makes Friends Easily	14	6	40.0	31.6	0.3745	0.05
10.	Often Trips and falls	23	15	67.5	78.9	1.0343	0.05
11.	Often Bumps into objects	23	15	65.7	78.9	1.0343	0.05
12.	Difficulty getting dressed	25	18	71.4	94.7	4.1245	0.05
13.	Often spills and gets dirty	25	15	71.4	78.9	0.3745	0.05
14.	Deviant Speech	19	10	54.3	52.6	0.0136	0.05
15.	Limited Vocabulary for Age	15	17	42.9	89.5	11.0847	0.001

Table 13b: Frequency of single soft neurological signs in patients and controls

		PATIENTS		CONTROLS			
		No.	%	No.	%	X^2	P
1.	Poor Concentration	51	94.4	0	0	96.6315	0.001
2.	Overactive compaired to other siblings	53	98.2	13	24.1	55.3807	0.001
3.	Requires constant encouragement to complete simple tasks	53	98.2	10	18.5	70.4380	0.001
4.	Problems remembering simple instructions	46	85.2	1	1.9	76.2804	0.001
5.	Easily Excitable	52	96.3	14	25.9	56.2597	0.001
6.	Conflicts with peers	44	81.5	18	33.3	25.5988	0.00
7.	Intense emotional reactions	51	94.4	14	25.9	52.8987	0.001
8.	Destructive	51	94.4.	12	22.2	57.9428	0.001
9.	Makes Friends easily	20	37.0	35	64.8	8.3363	0.01
10.	Often trips and falls	38	70.4	0	0	58.6286	0.001
11.	Often Bumps into objects	38	70.4	0	0	58.6286	0.001
12.	Difficulty getting dressed	43	79.6	16	29.6	22.6176	0.001
13.	Often spills and gets dirty	40	74.1	10	18.5	33.5172	0.001
14.	Deviant Speech	29	53.7	8	14.8	18.1302	0.001
15.	Limited vocabulary for age	32	59.3	2	3.7	44.7704	0.001

DISCUSSION

No local study is available for comparison, on any aspect of the hyperkinetic syndrome in children in Kenya. This was, thus, a very preliminary study and, as such, only certain aspects were covered. Several problems arose during the study, such as language barriers and poor memory of events long passed. Language barriers necessitated translation, during the time of interview, from English into another language, often not one in which the author spoke. A number of supplementary questions were sometimes asked in order to answer one of the questionnaire adequately. Furthermore, assessment of asphyxia probably created both false positives and negatives, and the fact that most of the children in this study were attending the neurology clinic, where the most common disorder seen is epilepsy, created an impression that convulsive disorders are very common in children with hyperkinetic syndrome. By applying the same methods to a control group probably reduced the bias created by such problems as those mentioned above.

The onset of illness in 81.5% of the patients in this study was on or before three years of age. This was in agreement with studies done elsewhere (11,22,23) and perhaps, factors responsible for this disease in other parts of the world are also contributory in our setting. The peak age of the children in this study was 5-8 years, 51.9% of children falling in this group. There

were 35(64.8%) males and 19(35.2%) females giving a male to female ratio of 1.8:1. Male preponderance has been found in other studies although the ratios were higher. Stewart and other workers (22) found a male to female ratio of 6.4:1, while Denson, Nanson and McWatters (11) found one of 9:1, Minde, Webb and Sykes (23) one of 8.3:1 and Coleman (9) one of 5.3:1. The low ratio found in the present study was not easy to explain.

Most of the information obtained was from the mothers. Though, only a few mothers from each group did not receive any formal education, there was a significant difference in the number achieving various levels of education between the two groups. For instance, 9(16.7%) of mothers of children in the control group reached University. As compared none of the mothers of the patients reached that level. This may have had a bearing on awareness of antenatal illnesses, for example and may have also influenced the mothers' liberty to divulge information concerning smoking and alcohol consumption.

It was noted that there was no significant difference between the average ages of the mothers in the two groups. However, the mothers of the patients were mainly in the 20-24 year age group while those of the controls were mainly between 25-29 years of age. Minde, Webb and Sykes (23) also noted that the mothers of the

patients they saw were younger, all of them being between 18-23 years of age, whereas the mothers of controls were often 30 years old or above. This factor was, however, of no significance because the increase in the incidence of brain injury with increasing maternal age is countered by the increase in postnatal problems in the younger mothers.

None of the mothers of the patients smoked, drunk alcohol or had any illnesses antenatally, which might have led them to ingest drugs. However, 5(9.4%) of the mothers of the controls admitted to having taken alcohol on and off, 2(3.7%) of them were hypertensives and were on antihypertensives and sedatives and 1(1.9%) was a diabetic on insulin. Minde, Webb and Sykes (23) quoted Werry as having found a higher incidence of toxaemias, antepartum haemorrhage and hypertension in the mothers of the hyperkinetic children they studied, compared to controls, which they did not find in their study. In the present study, this was difficult to evaluate since these factors did not affect mothers of the children with hyperkinetic syndrome. Nonetheless, Denson, Nanson and McWatters (11) found that the mothers of the hyperkinetic children they studied smoked two to three times as many cigarettes as the mothers of the controls in their study. It has been found that smoking leads to increased obstetric complications (24). It also leads to increased maternal blood carbon-monoxide

levels, this level being doubled in foetal blood. This leads to reduction of foetal oxygen and this may be further decreased in event of birth complications or even in prolonged labour in primiparous woman (25). The effects of alcohol on the foetal brain are well documented (12) but the quantity and duration of alcohol intake remains unclear. However, the children may be severely affected and may show features of the expanded foetal-alcohol syndrome.

An increased incidence of mental illness has been found in families of children affected in the hyperkinetic syndrome. In this study, none of the children had a history of mental illness in the family. This might have been due to withholding of information since mental illnesses are looked upon as social stigmata in many African settings. However, Cantwell (26) found that there was an increase of mental illness in the families of the hyperkinetic children he studied. These included alcoholism (19%) and sociopathy and hysteria. Stewart, Pitts and Craig (22) found a high incidence of depression and alcohol and drug abuse in the families of the children they studied.

Most of the children in this study were born at term at a health institution. Mean birthweights were within normal limits and though, the controls were slightly heavier, this was not significant. In the perinatal period the only illness which affected the patients

significantly more than the controls was jaundice. Later on in life, 81% of the children were noted to suffer from epilepsy. Other diseases occurred much less frequently. The mean length of labour for both patients and controls were also not significantly different. Previous studies have shown no differences in birth history and complications or perinatal morbidity in both patients and controls (11,22,23). However, Denson, Nanson and McWatters (11) and Minde and his fellow workers (23) found that there was a tendency to younger parental age and that patients tended to be first-borns. They suggested that though there was no difference in the extremes of labour, what was more important was a short duration of labour, or precipitate labour, leading to hypoxia due to tumultuous uterine contractions (27). The method of delivery had no bearing on the occurrence of th hyperkinetic syndrome in these children and though workers like Pasamanick (28) found increased incidence of pregnancy complications and instrumentation, during delivery, in the children they studied, they felt that disorders, such as the toxaemias had a significantly higher incidence in those children than mechanical injuries of birth. As for the high incidence of epilepsy in the hyperkinetic children in this study, there was a possibility that either epilepsy genuinely occurs more often in the hyperkinetic children in our setting or that their hyperkinetic symptoms were related to poor control of epilepsy due to poor patient

compliance. Ounsted (29) suggested that epilepsy and hyperkinesis may co-exist independently or that they could stem from similar cerebral territories. He found that males with the hyperkinetic syndrome were significantly more affected with epilepsy than females and that there was an initial insult leading to epilepsy in the first five years. The hyperkinetic symptoms in these patients were aggravated by anti-convulsants.

The children with the hyperkinetic syndrome in this study achieved their milestons within normal limits at examination they showed no physical abnormalities or gross neurological deficits. They however, displayed significantly higher frequencies of the soft neurological signs. Each patient displayed ten or more soft neurological signs compared to 0-3 in the controls. Signs 1-4 petaining to poor attention were the most frequent and the female patients had more problems with dressing and vocabulary. There was a significant difference in the frequency of all soft neurological signs between patients and controls. The controls made friends more easily which was not surprising since children with the hyperkinetic syndrome are known to have problems with interpersonal relationship (6). In previous studies (9,22,23), hyperkinetic children have been noted to have no physical abnormalities, but that they have a multitude of subtle, soft neurological signs pertaining to inattention, impulsivity and hyperactivity

with motor inco-ordination. Gilbert and Rasmussen (21) found that there was a significant difference in the signs he studied between patients and controls. He also found that behavioural and attentional signs were the most common in the children they studied.

None of the children in the index group attended school except one, a seven year old male. He attended school sporadically because neither the children in his class nor the teachers could stand his 'bad' behaviour. He attended the neurological clinic for convulsions which were well controlled on phenytoin. His parents were aware that he was more aggressive and overactive than his siblings but they thought that he was 'just different'. This portrayed a lack of knowledge of psychiatric disorders in children.

Finally, although this was not part of the study, it was noted that only 10(18.5%) of the patients were on appropriate therapy with stimulants as part of their management, the other being behaviour modification in the occupational therapy department of the Kenyatta National Hospital. Stimulants are known to improve concentration in children with this disorder, and to lead to improvement of behaviour and some motor problems (30,31). As such, they should have been considered an important part of the management of these children, who definitely exist in our environment.

CONCLUSIONS:

1. There are a significant number of children with the hyperkinetic syndrome in our setting.

2. Children with the hyperkinetic syndrome do not generally have previous significant antenatal or perinatal history apart from jaundice.

3. These children attain normal developmental milestones and have no gross abnormalities on physical examination.

4. Children with the hyperkinetic syndrome can be identified by soft neurological signs pertaining to conduct, attention deficits and fine motor co-ordination, and they display ten or more soft neurological signs, suggesting severe disease.

RECOMMENDATIONS:

1. A longer period of study is recommended if one has to obtain large enough numbers to be able to draw firm conclusions in this type of study.

2. As in all diseases, and especially those concerning child psychiatry, the public should be well informed in order to promote early consultation and management.

3. Screening with modified or available methods should be introduced, especially at school entry, the time of peak onset of the hyperkinetic syndrome.

4. Management should involve behaviour modification by both teachers and parents and stimulants thus leading to better social and school performances by affected children.

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APPENDIX I

DIAGNOSTIC CRITERIA FOR HYPERKINETIC SYNDROME

INATTENTION (4 of the following)

1. Needs a quiet calm atmosphere or is unable to work or concentrate.

2. Frequently asks for things to be repeated.

3. Easily distracted.

4. Confuses details.

5. Does not finish what he starts.

6. Hears but does not seem to listen

7. Difficulty in concentrating unless in 1 to 1 structured situation.

IMPULSIVITY (3 of the following)

1. Calls out in class

2. Extremely excitable.

3. Has trouble waiting his turn

4. Talks excessively

5. Disrupts over children.

HYPERACTIVITY (3 of the following)

1. Climbed onto cabinets and furniture.
2. Always on the go.
3. Fidgets and squirkes.
4. Does things in a loud and noisy way.
5. Must always be doing something

OTHERS

1. Onset before age 7 years.
2. Duration at least 6 months.

EXCLUSION CRITERIA

1. Disorders of sensory organs.
2. Severe profound mental retardation.
3. Pervasive developmental disorders
   e.g AUTISM and SCHIZOPHRENIA.

APPENDIX II

PROFORMA

1) A) NAME
B) IP NO.
C) SEX Male ___ Female ___
D) DATE OF BIRTH
E) AGE (IN MONTHS)

2) FATHER A) AGE
B) LEVEL OF EDUCATION
C) OCCUPATION
D) STATE OF HEALTH

3) MOTHER A) AGE
B) LEVEL OF EDUCATION
C) OCCUPATION
D) STATE OF HEALTH
E) TAKE ALCOHOL YES/NO
DURATION(YRS)
SMOKE YES/NO
DURATION(YRS)

4) ONSET OF ILLNESS - (AGE IN MONTHS)

5) PAST MEDICAL HISTORY (State ge at onset of illness)

i) CONVULSIONS YES/NO

ii) CEREBRAL INFECTIONS YES/NO

iii) MEASLES .... YES/NO
.....MILD/MODERATE/SEVERE

iv) DEHYDRATION YES/NO

v) HOSPITALISATION YES/NO
(REASON /PERIOD OF STAY)

6) A) FAMILY H_x OF SIMILAR ILLNESS..... YES/NO

FAMILY H_x OF MENTAL ILLNESS ..... YES/NO

7) ANTENATAL

A) MOTHER ATTENDED CLINIC YES/NO

B) DRUGS TAKEN DURING PREGNANCY APART FROM VITAMINS AND HAEMATINICS

C) APH YES/NO

D) HIGH-BP YES/NO

E) ANY OTHER ILLNESS YES/NO

8) LABOUR

A- PERIOD OF GESTATION (MONTHS)

B- LENGTH OF LABOUR 1st & 2nd STAGES (HRS)

C- MODE OF DELIVERY (INDICATED BY A TICK)

___ i) SPONTANEOUS VERTEX DELIVERY

___ ii) ASSISTED VAGINAL DELIVERY....WHY

___ iii) BREECH DELIVERY

___ iv) CAESARIAN SECTION..... WHY

9) BABY:

A) CRIED IMMEDIATELY YES/NO

If 'NO' after how long?

B) NORMAL BREATHING YES/NO

If 'NO' give details

C) KEPT IN INCUBATOR YES/NO

D) KEPT IN NURSERY

___
___ YES..... REASON

___
___ NO .....

E) JAUNDICE YES/NO

F)i) PHOTOTHERAPY YES/NO

ii) EXCHANGE TRANSFUSION YES/NO

G) BIRTH WT.

H) TWIN DELIVERY YES ___ NO ___

10) MILESTONES

i) HEAD CONTROL Months

ii) SITTING WITHOUT SUPPORT Months

iii) CRAWLING Months

iv) WALKING WITHOUT SUPPORT Months/Yrs

11) SOFT NEUROLOGICAL SIGNS

I) ATTENTION DEFICIT

1) CONCENTRATION..... GOOD/POOR

2) OVERACTIVE COMPAIRED TO OTHER SIBLINGS ..... YES/NO

3) PROBLEMS REMEMBERING INSTRUCTIONS ..... YES/NO

4) REQUIRES CONTANT ENCOURAGEMENT TO COMPLETE TASKS ..... YES/NO

II) CONDUCT PROBLEMS

5) EASILY EXCITABLE YES/NO

6) CONFLICTS WITH PEERS YES/NO

7) INTENSE EMOTIONAL REACTIONS YES/NO

8) DESTRUCTIVE YES/NO

9) MAKES FRIENDS EASILY YES/NO

III) MOTOR DYSFUNCTION

10) OFTEN TRIPS AND FALLS YES/NO

11) OFTEN BUMPS INTO OBJECTS YES/NO

12) DIFFICULTY GETTING DRESSED YES/NO

13) OFTEN SPILLS AND GETS DIRTY YES/NO

14) DEVIANT SPEECH YES/NO

15) LIMITED VOCABULARY YES/NO

12) PHYSICAL EXAMINATION

i) GENERAL CONDITION

ii) PHYSICAL DEFECTS

iii) HEAD CIRCUMFERENCE (cm)

iv) SPEECH

v) HEARING

vi) VISION

vii) CNS

viii) CVS

ix) RS

x) PA

APPENDIX III

SCHOOL REPORT

1) DATE

2) NAME OF CHILD

3) NAME OF SCHOOL CLASS

4) Please explain in your own words briefly, the child's main problem.

5) ACHIEVEMENT IN CLASS (Indicate)

VERY GOOD ——

AVERAGE ——

BARELY PASSING ——

FAILING ——

6) DO OTHER CHILDREN IN THE FAMILY WHO ATTEND YOUR SCHOOL HAVE ANY PROBLEMS? IF YES PLEASE EXPLAIN.