

Pattern of Paediatric Neurological Disorders in Paediatric Neurology Unit of AL-Azhar University Hospitals in Egypt

Shora Y. Darwish, Morsy A. Ammar, Hassan K. Gad, Hussein A. El-Gharieb, Mohie El –Din T. Mohamed, Ahmed M. El-metwaly

Departments of Neurology, Community Medicine and Public Health, AL-Azhar University, Cairo; Egypt
Mohey.tharwat@yahoo.com

Abstract: Background: Paediatric neurological disorders in developing countries are important causes of mortality and morbidity and are therefore sources of major concern to parents and health workers worldwide. Studies on the pattern of neurological disorders in children are valuable in understanding trends and characteristics of these conditions and also for preventive health purposes. There are limited data on the pattern and prevalence of paediatric neurologic conditions in Egypt. Therefore, the **aim of this study** was to demonstrate the patterns of neurological disorders in a sample of Egyptian children at the Paediatric Neurology Unit of AL-Azhar University Hospitals. **Subjects and methods:** The present study included all children attended to Paediatric Neurology Unit (outpatient and inpatient) of Al-Azhar University Hospitals in the period between the beginnings of October, 2013 to the end of March 2014. All children below 18 years were included. Complete clinical, laboratory and radiological evaluation was done according to each case. Descriptive statistics was used to present the results. **Results:** During this period a total of 536 patients presented with different neurological disorders were seen. There were 299 males (55.78 %) and 237 females (44.22 %). Epilepsy and other paroxysmal disorders were the commonest neurological disorders accounted for about 172 cases (32.08%), epilepsy cases were 162 cases (30.22 %) and breath-holding spells cases were 10 cases (1.86 %). Out of all epileptic cases, grand mal seizure was the predominant type occurred in 65 (40.12%). The second common neurological disorder was cerebral palsy which was found in 104 cases (19.40%). Spastic quadriplegic type was the commonest type (53.85%). There was a significant relation between cerebral palsy and epilepsy, which was found in 63 cases (60.58 %) of CP children. The most common etiology of CP was neonatal asphyxia which was found in 76 cases (73.08%). Headaches accounted for 40 cases (7.46 %) of neurological disorders. **Conclusion:** Wide spectrums of neurological disorders occur in our country and constitute a huge burden for children in Egypt. The higher frequency of epilepsy and cerebral palsy suggests that priority should be given to research, education and preventive measures with early diagnosis and proper management. [Shora Y. Darwish, Morsy A. Ammar, Hassan K. Gad, Hussein A. El-Gharieb, Mohie El –Din T. Mohamed, Ahmed M. El-metwaly **Pattern of Paediatric Neurological Disorders in Paediatric Neurology Unit of AL-Azhar University Hospitals in Egypt.** *Nat Sci* 2015;13(5):139-144]. (ISSN: 1545-0740). <http://www.sciencepub.net/nature>. 19

Key words: neurological disorders; children; cerebral palsy; epilepsy; Egypt.

1. Introduction

Neurological disorders in children are important causes of mortality and morbidity around the world and are therefore sources of major concern to parents and health workers worldwide. Studies on the pattern of neurological disorders in children are valuable in understanding trends and characteristics of these conditions and also for preventive health purposes. Few studies were performed on the pattern of neurological conditions among children attending pediatric neurology unit. Although Hospital medical statistics do not reflect the true prevalence of a particular disease in the developing countries, they serve as an important source of information about any disease (1).

These disorders could arise from prenatal, perinatal and postnatal pathological changes or lesions of the peripheral or central nervous system. Genetic factors, chromosomal abnormalities, metabolic

disorders and trauma are known to play a significant role with respect to the etiology of pediatric neurological disorders (2).

Pediatric neurological disorders in developing countries are not only expensive but also are very challenging. The disease chronicity, late presentation and unavailability of modern diagnostic facilities are the factors that may contribute significantly to increased morbidity and mortality in developing countries (2). In more developed countries, advances in diagnostic techniques have aided the characterization and definition of diseases (3).

Neurological disorders in children are common occurrence in clinical practice (4). The disorder account for more than 20% of the world's disease burden with a greater majority of people affected living in Africa (5).

Current knowledge on risk factors and epidemiology of such conditions is mostly based on

American or European studies and few studies from Egypt have been published on profile of paediatric neurological disorders (6). The current study was carried out to evaluate the patterns of paediatric neurological disorders in a sample of Egyptian children at the Paediatric Neurology Unit of AL-Azhar University Hospitals. This may give a spotlight on the types and aetiology of these disorders in one of the developing countries. Also, this work may be considered a nucleus in the field of epidemiology of paediatric neurology in Egypt.

2. Subjects and methods

The study included all children attended to Paediatric Neurology Unit (outpatient and inpatient) of Al-Azhar University Hospitals (Al-Hussein & Bab-Al-Shaaria) in the period between the beginnings of October, 2013 to the end of March, 2014. All patients below the age of 18 years were included in the study. The United Nations Convention on the Rights of Child (UNCRC) defined the child as every human being below the age of 18 years (7). All patients (new and old cases) were subjected to the following: Detailed medical and neurological history, full general and neurologic examination. Selected procedures according to each case such as: Brain computed tomography scan and magnetic resonance imaging studies were carried out for individual patients as needed. Electroencephalography (EEG) was done for patients with seizure disorders. Neuropsychological assessment: Intelligence Quotient (IQ) to detect mental sub-normality (by using Stanford Bennet test). Nerve conduction study and Electromyography were performed in cases of lower motor neuron lesions and Visual evoked potential (VEP) in cases of multiple sclerosis. Cerebrospinal fluid analysis was done in suspected cases of CNS infection, oligoclonal bands and IgG index in cases of M.S. Routine blood investigations such as complete blood cell count and blood chemistry (Serum calcium, magnesium and phosphorus). Selected laboratory assessment in blood was done: Metabolic testing when needed such as: serum lactate level in cases of mitochondrial disorders, serum phenylalanine level in cases of phenylketonuria, serum Aryl sulfatase A and very long chain fatty acids (VLCFA) in cases of leukodystrophies (8,9) and Screening of amino acids or organic acids in blood or urine. Multiple sclerosis (MS) cases were diagnosed according to **McDonald criteria 2001**(10). Genetic study: in some cases when needed. **Statistics:** All data are collected, presented and analyzed by using an appropriate statistical package program (SPSS version, 13). Qualitative data are presented by number and percentage. Test of significance was chi square.

3. Results

In the present study, a total of 536 patients were seen in the Paediatric Neurology Unit of Al-azhar University Hospitals during the period from the beginning of October 2013 to the end of March 2014. There were 299 males (55.78 %) and 237 females (44.22 %).

The presented children were classified into 4 groups according to age: Below 3 years accounted for 44 cases (8.21 %), from 3 years to below 6 years accounted for 138 cases (25.75 %), from 6 years to below 12 years accounted for 229 cases (42.72 %), from 12 years to below 18 years accounted for 125 cases (23.32 %). The age of patients ranging from 6 years to below 12 years accounted for the most affected age group constituting 42.72%, **Table(1)**.

Epilepsy and other paroxysmal disorders were the commonest neurological disorders accounting for about 172 cases (32.08%), epilepsy cases were 162 cases (30.22 %) and breath holding spells cases were 10 cases (1.86 %). The second common neurological disorder was cerebral palsy representing 104 cases (19.40%). Headaches accounted for 40 cases (7.46 %). Neuromuscular disorders accounted for 33 cases (6.16 %). White matter disorders accounted for 32 cases (5.97%). Central nervous system (CNS) infections accounted for 20 cases (3.73 %), viral was 12 cases (2.23%), Bacterial was 8 cases (1.49%). Cerebrovascular disorders (CVD) accounted for 20 cases (3.73 %). Metabolic and degenerative disorders accounted for 14 cases (2.61%). Hereditary disorders accounted for 14 cases (2.61%). Congenital disorders accounted for 5 cases (0.93%). Central nervous system (CNS) tumours accounted for 5 cases (0.93 %). The miscellaneous group accounted for 77 cases (14.36 %), **Table (2)**.

A total of 162 children were diagnosed as having epilepsy. The predominant type of seizure was Grand mal (GTCS), occurred in 65 cases (40.12 %) and myoclonic seizure in 4 cases (2.47 %) which was the least common type.

The different types of CP included, spastic quadriplegia was found in 56 cases (53.85%), mixed type was in 18 cases (17.31%), spastic hemiplegia was in 10 cases (9.62%), spastic diplegia was in 10 cases (9.62%), hypotonic type was in 6 cases (5.77 %), Dystonic type was in 2 cases (1.92 %) and ataxic type was in 2 cases (1.92 %).

Epilepsy was found in 63 cases (60.58 %) of CP children which is statistically significant (P value < 0.05). Epilepsy was predominant in Quadriplegic type 37 cases (35.58 %) and less frequent in Diplegic and Dystonic types 1 case each (0.96 %), **Table 3**. The most common aetiology of CP was neonatal asphyxia which was found in 76 cases (73.08 %).

Headaches accounted for 40 cases (7.46 %) of neurological disorders. Migraine was found in 20 cases (50 %). pseudo tumour cerebri was found in 8 cases (20 %). Tension headache was found in 12 cases (30 %). Neuromuscular disorders accounted for 33 cases (6.16 %). Bell's palsy was found in 10 cases (30.30 %). Myopathy was found in 10 cases (30.30 %). Myasthenia gravis was found in 6 cases (18.18 %). Guilliane Barre syndrome was found in 4 cases (12.12 %). Spinal muscular atrophy was found in 2 cases (6.06%). sciatic nerve injury was found in 1 case (3.03 %).

White matter disorders accounted for 32 cases (5.97%). Acute disseminating encephalomyelitis (ADEM) was found in 16 cases (50 %). Leukodystrophies were found in 10 cases (31.25 %). Multiple sclerosis was found in 6 cases (18.75 %).

Central nervous system (CNS) infections accounted for 20 cases (3.73 %), viral infection was recorded in 12 cases (2.23 %) and Bacterial infection was in 8 cases (1.49 %).

Cerebrovascular disorders accounted for 20 cases (3.73 %). Intracerebral haemorrhage was found in 4 cases (20 %). Ischemic stroke was found in 10 cases (50 %). Subarachnoid haemorrhage was found in 6 cases (30 %).

Metabolic and degenerative disorders accounted for 14 cases (2.61 %). Mitochondrial disorders were found in 6 cases (42.86%). Mucopolysaccharidosis was found in 4 cases (28.57 %). Phenylketonuria was found in 4 cases (28.57 %).

Hereditary disorders accounted for 14 cases (2.61%). Hereditary ataxias were found in 6 cases (42.86 %). Hereditary neuropathy was found in 8 cases (57.14 %). Congenital disorders accounted for 5 cases (0.93 %). Hydrocephalus was found in 3 cases (60 %) and meningocele was found in 2 cases (40 %).

CNS tumours accounted for 5 cases (0.93 %). Cerebellar astrocytoma was found in 2 cases (40 %) and medulloblastoma was found in 3 cases (60 %).

Amongst the miscellaneous group, the neurological disorders were ADHD in 46 cases (59.74 %), Autism in 10 cases (12.98 %), Down syndrome in 5 cases (6.49 %), Rheumatic chorea in 3 cases (3.89 %), Tuberos sclerosis in 2 cases (2.59 %), 1 case (1.29 %) for each of the following: sturge weber syndrome, motor tics, Angelman syndrome and cri du chat syndrome. There were 7 cases (9.09 %) of unknown aetiology.

Table 1 : Age and sex distribution of the patients

| Sex | Male | | Female | |
|-----|-----------|--------------|----------------|----------------|
| | N | % | N | % |
| | 299 | (55.78) | 237 | (44.22) |
| Age | < 3years | 3 - <6 years | 6 - < 12 years | 12 - <18 years |
| | 44 (8.21) | 138 (25.75) | 229 (42.72) | 125 (23.32) |

Table 2: Distribution of different paediatric neurologic disorders

| Disorder | N : total (536) | | | % |
|---|-----------------------|-----|-----|---------|
| Epilepsy and other paroxysmal disorders | Epilepsy | 162 | 172 | 30.22 |
| | Breath holding spells | 10 | | 1.86 |
| (32.08) | | | | |
| Cerebral palsy (CP) | 104 | | | (19.40) |
| Headaches | 40 | | | (7.46) |
| Neuromuscular disorders | 33 | | | (6.16) |
| White matter disorders | 32 | | | (5.97) |
| CNS infections | Viral | 12 | 20 | 2.23 |
| | Bacterial | 8 | | 1.49 |
| (3.73) | | | | |
| Cerebrovascular disorders (CVD) | 20 | | | (3.73) |
| Metabolic and degenerative disorders | 14 | | | (2.61) |
| Hereditary disorders | 14 | | | (2.61) |
| Congenital disorders | 5 | | | (0.93) |
| CNS Tumours | 5 | | | (0.93) |
| Miscellaneous | 77 | | | (14.36) |

Table 3: Relation between CP and epilepsy

| CP \ Epileptic | Epileptic | | Not epileptic | | X ² | P-value |
|----------------|-----------|---------|---------------|---------|----------------|---------|
| | N | % | N | % | | |
| | 63 | (60.58) | 41 | (39.42) | | |
| Quadriplegic | 37 | (35.58) | 19 | (18.27) | 15.697 | 0.015* |
| Mixed | 13 | (12.50) | 5 | (4.81) | | |
| Hemiplegic | 5 | (4.81) | 5 | (4.81) | | |
| Diplegic | 1 | (0.96) | 9 | (8.65) | | |
| Hypotonic | 4 | (3.85) | 2 | (1.92) | | |
| Dystonic | 1 | (0.96) | 1 | (0.96) | | |
| Ataxic | 2 | (1.92) | 0 | (0.00) | | |

4. Discussion

In the present study, there were a total of 536 children were seen in the Paediatric Neurology Unit of Al-azhar University Hospitals. There were 299 males (55.78 %) and 237 females (44.22 %). The predominance of boys with neurological disorders in this study is in agreement with results reported by Burton and Allen & Frank and Alikor, (4,1). This may be explained by a male child being brought to the hospital for medical attention than the female especially in the developing countries which is considered as a part of social habits.

In the current study, epilepsy/seizure disorder was the commonest neurological disorder, occurred in 162 (30.22 %) of patients. This is in agreement with results reported by other studies of Ogbe *et al.* & Okafor and Lagunju & Frank and Alikor, (11,12,1).

Mosser *et al.*, reported that epilepsy accounts for 27% of all neurological diagnoses associated with a substantial burden on physical and mental health (13). This high prevalence of epilepsy recorded in this study may be explained by increasing awareness that epileptic seizure is a medical condition which is treatable as against prior believe that it is caused by evil spirit manipulation and witchcraft attacks. Episodic and unpredictable nature of epilepsy makes it harder to live with than other childhood disabilities. Both mothers and fathers live in fear of the next attack. It is common in newly diagnosed cases that one parent will stay up all night for fear that the child will die in its sleep, so they sought medical advice early (14).

In the current study, the predominant type of seizure was Grand mal (GTCS) as it occurred in 65 (40.12 %) of patients. This finding is in agreement with results reported by Okafor and Lagunju & Frank and Alikor, and is not consistent with the findings of Kotsopoulos *et al.*, who found that partial seizures to be more frequent in children than grand mal epilepsy (12,1,15). This difference may be explained by the partial seizures remain unnoticed and the patients sought medical attention when it had secondarily evolved into generalized tonic-clonic seizure.

Cerebral palsy was the second most common neurological conditions in this study representing 19.4 %. This high percentage may reflect the fact that antenatal and perinatal medical care in our environment are still not at their best. This result is in agreement with the previous studies of Ogbe *et al.* & Frank and Alikor, (11,1). On the other hand, Okafor and Lagunju, reported that cerebral palsy was the second commonest neurological disorder but with higher percentage 36%, (12). This may be explained by short duration of the present study and small number of patients.

In the present study, perinatal causes especially neonatal asphyxia was the commonest aetiology of cerebral palsy accounted 73.08 % of patients. This is in agreement with the previous studies of Bruck *et al.* & Behrman *et al.*, & Frank and Alikor, They reported that the most common risk factors for cerebral palsy include birth asphyxia, bilirubin encephalopathy and post infectious brain damage (16,17,1).

Eltallawy *et al.*, reported that birth asphyxia leading to neonatal encephalopathy and subsequent cerebral palsy and is often considered to be caused by damage occurring during labour (6). On the other hand, Jacobsson and Hagberg, reported that evidence suggests that 70-80% of cerebral palsy cases are due to prenatal factors and that birth asphyxia plays a relatively minor role. Some antenatal risk factors are repeatedly observed to be related to CP as low gestational age, male gender, multiple gestation, intrauterine infections and maternal thyroid abnormalities (18).

Many studies in developed countries reported that the lack of possible aetiological factors in many cases suggests that the high level might also be due to other factors, such as genetic disorders. Our results may be explained by, in the developed countries for a long time birth asphyxia was presumed cause of most CP. As a result, research focussed on the time of birth as the point at which to medically intervene to reduce incidence of CP and Perinatal care to reduce the incidence of birth injuries. Also availability of diagnostic equipments assist in the definitive

diagnosis of other aetiologies of CP. In the developing countries lack of medical services especially perinatal care, poor general income of most inhabitants with large family numbers and lack of advanced diagnostic techniques that diagnose other aetiologies of CP make birth asphyxia remain the most common aetiology of CP in developing countries (19,20).

In the current study, epilepsy was found in 63 cases (60.58 %) of CP children. In India Kaushik *et al.*, reported that 56% of 50 patients with CP were associated with epilepsy (21). In Brazil Bruck *et al.*, reported that the overall incidence of epilepsy in children with cerebral palsy was 62%, (16). In Indonesia Sianturi *et al.*, reported that the incidence of epilepsy with cerebral palsy was 37.3%, (22). In Sweden Jacobsson and Hagberg, reported that co morbidity of CP with epilepsy is estimated to be as high as 30– 50%, (18). In Nigeria, Okafor and Lagunju, reported that the incidence of epilepsy with cerebral palsy was 33.1%,(12). This relationship between epilepsy among children with CP is being established and this could be explained by the fact that children with bilateral CP might suffer extensive brain injury including cortex, deep white matter and central nuclei and therefore they are liable to mental retardation and epilepsy (20,23). Hence, an early intervention with treatment of epilepsy prevents further progression of neuronal injury with subsequent cognitive impairment caused by uncontrolled seizures among those patients.

In the current study, spastic type was the commonest subtype of CP representing 73.07% which is consistent with that of Stanley *et al.* & Majnemer and Mazer, (24,25).

Eltallawy *et al.*, reported that patients with spastic CP were more frequent, 37 (72.5%) of all patients with CP (6). The proportion of children with quadriplegic CP in this study was 56% and this is in agreement with results reported by Ogbe *et al.*, Okafor and Lagunju & Frank and Alikor, (11,12,1). Eltallawy *et al.*, reported that quadriplegic CP was 67.5 % which consider higher than that reported in a study carried out in Norway (14.9%) and another two studies from western sweden (6% and 10%), (6,26,27).

Serdaroğlu *et al.*, reported that, type of CP was diplegic in 39.8% of children, hemiplegic in 28%, tetraplegic in 19.9%, ataxic in 5.9%, and dyskinetic in 6.4% which is not consistent with the present study (28). In the present study, the proportions of ataxic CP was 1.92% which is nearly similar to Andersen *et al.*, who reported that ataxic type of CP was found in 5% of their sample. Mixed type was found in 23.5% of CP cases considering higher; this difference could be attributed to a different classification in which some children with dyskinetic CP were considered as having unclassified or mixed type of CP when there

are difficulties in deciding the most dominant signs in these cases (20).

In the current study, CNS infections were found in 20 cases (3.7%) and this was less than that reported by Frank and Alikor, (1). This may be explained by short duration of our study and usually most cases thought medical advice at fever hospital.

Congenital CNS anomalies and CNS tumours accounted for a small proportion of childhood neurological disorders in this study. This may be explained by most of such children are seen in the neurosurgical unit of the hospitals and does not necessarily suggest that these disorders are rare in our hospitals.

Paediatric neurology is an important speciality in various universities in the developed countries and this speciality in Egypt is practiced randomly without scientific base or specific system of training, so training programmes, researches and curricula must be activated to ensure the graduation of qualified specialists in this field. Health education to mothers with pre and perinatal care are important in decreasing complications of pregnancy and labour.

Conclusion

Wide spectrums of neurological disorders occur in our country and constitute a huge burden for children in Egypt. The higher frequency of epilepsy and cerebral palsy suggests that priority should be given to research, education and preventive measures with early diagnosis and proper management.

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