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Original Research Article

Spectrum of neurological disorders in children: a 5-year review from a single tertiary hospital in Rivers State, Nigeria

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ABSTRACT

Background: Neurological disorders in children from developing countries, such as Nigeria, are increasingly varied. Understanding the spectrum of this disorder and having reliable epidemiological data are important for workforce development and instituting preventive modalities to reduce its occurrence. This study aims to examine the patterns and risk factors of neurological disorders among children presenting at the University of Port Harcourt Teaching Hospital (UPTH).
Methods: A descriptive study was conducted among children who attended the consultant paediatric clinic (CPC) from January 2020 to December 2024. A retrospective abstraction of patients' demographic data and clinical information from their hospital records was done. Statistical package for the social sciences (SPSS) version 25 was used for analysis.
Results: A total of 30,824 children under 18 years attended the CPC over the five years; 6281 (20.4%) had neurological diseases. Of these, 3844 (61.2%) were males, and 2437 (38.8%) were females, giving a male to female ratio of 1.6:1. Epilepsy was the most common neurological disorder, accounting for 2,135 cases (34.0%), followed by central nervous system (CNS) infections with 1765 (28.1%) and cerebral palsy with 1005 (16.0%) cases. The common risk factors were birth asphyxia (40.3%), CNS infections (30.2%), neonatal jaundice (13.3%), and prematurity (6.3%).
Conclusions: The prevalence of neurological disorders is high in our setting; with epilepsy, CNS infections and cerebral palsy as the most common. There is a male preponderance and the risk factors are mostly preventable and requires improving maternal, new-born and child care.

Keywords: Spectrum, Neurological disorders, Children, Neurology clinic, Port Harcourt

INTRODUCTION

Childhood neurological disorders are significant causes of morbidity and mortality, and a leading cause of chronic disorders worldwide. This group of disorders accounts for above 20% of global disease burden, with most of those affected living in developing countries, such as most African countries.[1,2] Neurological disorders include central nervous system infections, epilepsy, neurodevelopmental disorders, congenital central nervous system malformations, and many others.[3-5] Management of these conditions requires a multidisciplinary approach, with the paediatric neurologist coordinating the care.[5] Understanding the spectrum of this disorder and having reliable epidemiological data are important for workforce development and instituting preventive modalities to reduce its occurrence.

Neurological disorders are frequently encountered disorders in paediatric clinics with varying prevalence rates. Globally, epilepsy, stroke, and migraines, in addition to other types of headaches, have been reported as the common cases seen by neurologists.[6]

The prevalence of paediatric neurological disorders varies depending on the geographic location, the level of advancement in maternal and child care, particularly as it concerns the obstetric and new born care. In addition, the

availability of skilled personnel and advanced technology all contribute to the disparity in the pattern and burden of this disease.[1,2,6]

Lagunju et al reported a prevalence of 21% in Ibadan, a Southern state in Nigeria, and reported that cerebral palsy and epilepsy were the prevalent disorders observed in their neurology clinic.[3] Similarly, Ejeliogu et al reported that epilepsy, cerebral palsy, and intellectual disabilities were the common disorders in Northern Nigeria, with 21.3% as the prevalence rate of neurological disorders in their study.[6]

Studies in Port Harcourt have reported varied prevalence rates and patterns; this could be due to variation in their setting, the time frame, and study design. West and Aitafo reported a rather low prevalence of 0.9% from a private hospital over a one-year review and opined that females were more affected.[5] Recently, Gabriel-Job and Wobo studied the profile and pattern of neurological emergencies among children admitted into the children's emergency ward of the UPTH; however, the pattern of the disease seen in the paediatric neurology clinic was not addressed.[7] Although Frank-Briggs and Alikor had studied the pattern of neurological disorders seen among children attending the paediatric neurology clinic in UPTH. This study was carried out 14 years ago.[8] They reported that under-fives were mostly affected, and opined that epilepsy, cerebral palsy, and infection of the central nervous system were the most prevalent disorders.

This study aims to address this gap in knowledge, which is to provide empirical data that shows the current epidemiological patterns of neurological diseases and their risk factors among the paediatric age group in UPTH. Understanding the spectrum of this disorder and having reliable epidemiological data are essential for comparison, and this can inform workforce development and the implementation of preventive modalities to reduce its occurrence.

METHODS

Study setting

The study was carried out in the Consultant Paediatric Clinic of the University of Port Harcourt Teaching Hospital, Rivers State, Nigeria, over a 6 months period from January 2025 to June 2025 among children with neurological disorders who attended the clinic from January 2020 to December 2024. The hospital is a tertiary health facility that serves the state and its neighbouring states, it has a well-established paediatric department.

The consultant paediatric clinic (CPC) has eleven subspecialty clinics, including Paediatric Neurology Clinic (PNC). Every child with a neurological disorder is referred to the Paediatric Neurology Clinic. The clinic operates every Friday except on public holidays, and on each clinic day, 25-40 patients are seen.

Study design

A descriptive study was carried out, in which a retrospective abstraction of patients' data from January 2020 to December 2024 was done.

Sampling method

The records of all the patients who attended the clinic from January 2020 to December 2024 were consecutively entered into a structured proforma.

Participants

Participants were children less than 18 years who attended the PNC clinic within the stated period. Patient's hospital numbers were obtained from the paediatric neurology clinic record; the hospital folders were obtained from the record department following approval from the head of the record unit. The patients' socio-demographic data, including the age at presentation and clinical information; clinical presentation, investigation, possible risk factors, and diagnosis, were obtained from their hospital records. The diagnosis was based on the clinical history, investigations (including electroencephalogram (EEG), cerebrospinal fluid analysis, blood culture, full blood count, differentials, blood chemistry and blood film for malaria parasite and neuroimaging) and clinical examination. Appropriate treatment was given to each patient, with most of them requiring a multidisciplinary review.

The information obtained was entered into a structured proforma. All the children less than 18 years of age who attended the paediatric neurology clinic with a diagnosis of neurological disease were included in the study while folders with missing or incomplete medical records were excluded.

Socioeconomic classification

This was based on the scheme that was proposed by Ibadin et al, where the parent's highest level of education and the present occupation (for the father and mother; 2 scores each) were used to calculate a mean score.[9] The socioeconomic classes were grouped into upper, middle and lower socioeconomic classes based on the mean of the total scores obtained.

Data analysis

Data was first entered in an excel sheet, cleaned, and then was analysed using statistical package for the social sciences (SPSS) version 25. Descriptive statistics such as mean and standard deviation, frequency, and proportion were obtained.

Results were presented in prose, as frequency tables and graphs.

RESULTS

Within the period, a total of 30,824 patients attended the CPC. There was variation in the yearly clinic attendance, with the highest attendance recorded (7109; 23.1%) in 2022 while the least clinic attendance was in the year 2020 with 5428 (17.6%) patients. Of the 30,824 patients who attended the CPC, 6281 of them had neurological disorders (giving a prevalence of 20.4%). More than half of these, 3844 (61.2%), were males, while 2437 (38.8%) of them were females, giving a male to female ratio of 1.6:1.

The highest neurology clinic attendance was in 2022, were 1546 (24.6%) patients were in in attendance while the least was in 2020, were 1116 patients presented which was 17.8% of total number of patients seen in paediatric neurology clinic within the period under review (Figure 1).

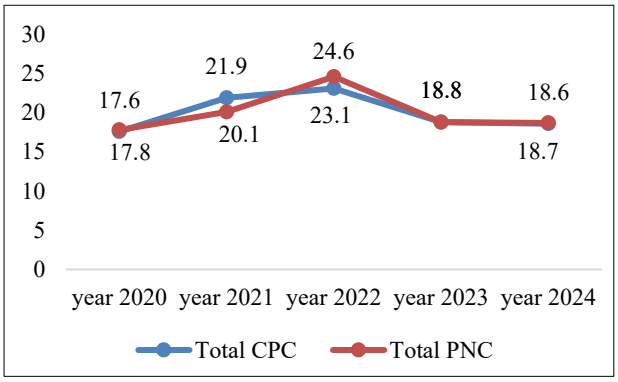

Figure 1: Proportion of children seen in the CPC and PNC from January 2020-December 2024.

Their ages at presentation ranged from 2 days old to 17 years, with a mean age at presentation of 4.98±3.64 years. Forty five percent of the patients (2826) were between the ages of 1 year and 5 years at presentation, this was followed by 6 years and10 years (Figure 2).

About half 3455 (55.0%) of the patients reside in rural areas, while 2826 (45.0%) reside in urban areas. Concerning their social classes, 1256 (20.0%) belong to the upper socio-economic class, 2010 (32.0%) from the middle socio-economic class, while 3015 (48.0%) were from the lower socio-economic class.

The presenting complaints includes; convulsion which was the most common with 2286 (36.4%), this was followed by delayed milestone in 2186 (34.8%) then poor speech and stiffness of the body in 6.5% and 6.2% of the patients respectively (Table 1).

With regards to the types of neurological disorders seen among the patients. The most common was epilepsy accounting for 2,135 (34.0%), this was followed by Post CNS infections 1765 (28.1%) and then cerebral palsy 1005 (16.0%). Others include global developmental delays (377; 6.0%), autism spectrum disorders (239; 3.8%), speech and language delays (126; 2.0%) and others (Table 2).

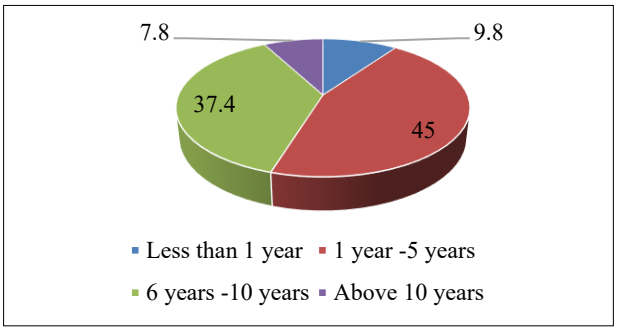

Figure 2: Ages of children who presented with neurological disorders.

Table 1: Common presenting complaints at presentation.

Variables	Frequency	Percentage
Convulsions	2286	36.4
Delayed developmental milestones	2186	34.8
Poor speech	408	6.5
Stiffness of the body	390	6.2
Poor school performance	364	5.8
Weakness of the limb(s)	220	3.5
Hyperactive	157	2.5
Abnormal behaviour	119	1.9
Fainting spells	88	1.4
Headaches	63	1.0
Total	6281	100.0

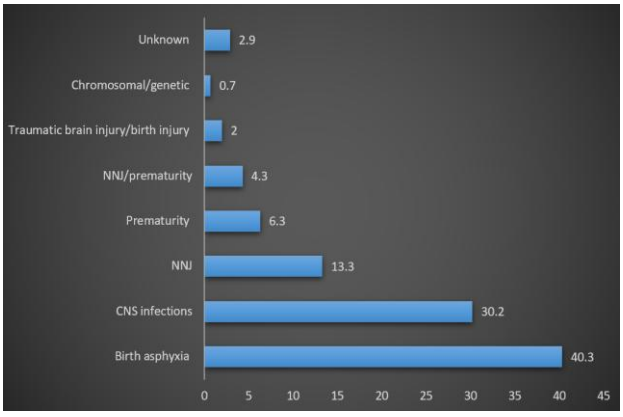

Figure 3: Risk factors for neurological disorders.

Two hundred and seventy-two (33.0%) children had multiple neurological disorders, while 4,209 (67.0%) had a single neurological disorder.

Regarding the risk factor for neurological disorders among the patients, birth asphyxia accounted for 2531 (40.3%), followed by central nervous system infections in 1897

(30.2%) and neonatal jaundice in 835 (13.3%). Other risk factors include prematurity 396 (6.3%), combination of prematurity and neonatal jaundice (4.3%). While traumatic brain injury and birth injury accounted for 127 (2.0%), chromosomal/genetic causes accounted for 45(0.7%) and in 180 (2.9%) cases the aetiological factors were unknown (Figure 3).

Table 2: The spectrum of neurological disorder seen among paediatric patients.

Types	Frequency	Percentage
Epilepsy	2,135	34.0
Post CNS infections	1,765	28.1
Cerebral palsy	1005	16.0
Global developmental delays	377	6.0
Autism spectrum disorder	239	3.8
Speech and language delays	126	2
Intellectual disability	75	1.2
Hearing disorder	63	1
ADHD	57	0.9
Psychogenic non epileptic seizures	44	0.7
Behavioural disorder	31	0.5
CVD	31	0.5
Hydrocephalus	31	0.5
Brain tumours	31	0.5
Microcephaly	25	0.4
Neural tube defects	19	0.3
Migraine	19	0.3
Tics disorder	19	0.3
Learning disorder	19	0.3
Visual impairment	19	0.3
Muscular dystrophy	19	0.3
Neurocutaneous syndromes	13	0.2
Bell's palsy	13	0.2
HIV related CNS disorders	6	0.1
Myasthenia gravis	6	0.1
Erbs palsy/Klumpkes palsy	6	0.1
Myopathy	6	0.1
Guillen Barrs	6	0.1
Others	82	1.3
Total	6281	100.0

DISCUSSION

This descriptive study examined the pattern of neurological disorders among children attending the consultant paediatric clinic in UPTH from 2020 to 2024. The decline in attendance observed in 2020 may be due to the pandemic-related restrictions, phobia for hospital visits within that period, as well as the disruptions to essential healthcare services which were reported worldwide.[10] While, the peak in clinic attendance and neurological cases noted in the year 2022 could be a reflection of the rebound in the utilization of the health facilities after COVID-19 pandemic.[10]

This study shows that neurological disorder is common in our setting and contributes to the high number of cases seen in the paediatric clinic. The prevalence observed in this study is similar to a report from Ibadan, South-West Nigeria and Jos, North-Central Nigeria, where 21.0% of the total consultations in a paediatric specialist clinic were due to paediatric neurological disorders.[3,6] This is however, at variance with the 9.7% and 6.7% reported by Akodu et al and Frank-Briggs et al respectively.[5,8] This difference could be as a result of greater awareness that neurological disorders can be managed using orthodox medicine. For instance, the study by Frank-Briggs et al was carried out 14 years ago and spanned over 6 years; however, the total number of patients with neurological disorders that presented within the period was 2379 out of the 35,473 patients that presented to the clinic, while in this study there were 6281paediatric neurology consultations out of the 30,824 patients that presented within the 5 years period.[8]

This study found the mean age at presentation for children with neurological disorder to be 4.98±3.64 years, a finding that is similar to Ibrahim et al in a study carried out in Pakistan. This reflects the poor health seeking behaviours observed among those from developing countries where most of them present to the clinic late.[11] Socio-cultural belief and stigma may have contributed to delay presentation.[12] Also, it is possible that despite delayed developmental milestone which is a common complaint, as observed in this present study, parents/caregivers may have been waiting hopefully for them to achieve the milestones, which may be the reason 45.0% of those in this present study presented at 1-5 years of age despite the insult occurring much earlier as birth asphyxia was the most common risk factor in this study.

In this study, more males compared to females had neurological disorder with a male to female ratio of 1.6:1. This finding is similar to previous Nigerian studies and a study by Ibrahim et al where males were reported with higher proportion of neurological disorders.[8,10,13] It has been reported that due to socio-cultural reasons males are brought to seek medical help more than females in developing countries as male preference is often a recognized practice in these settings.[5,11,14] In contrast, in Gandhi et al study, there was more female preponderance compared to males.[14] This was a community-based survey where adult population were included and the most common neurological disorder reported was migraine which is common among females. Studies have shown that females are three times more likely to suffer from migraine compared to males, and that 85% of those suffering from migraines are females.[15]

Neurological disorders in this study were common among children from lower socioeconomic class and from those residing in rural areas. This is in agreement with finding from Ibrahim et al and Leijser et al.[11,16] Studies have reported that children from lower social classes were two times more likely to experience developmental delay and develop neurological disorders compared to those from higher socioeconomic classes. Also, intellectual disability, epilepsy, and cerebral palsy have been reported to be higher among children from underprivileged households.[16,17] The reason for this could be due to poor access to maternal and newborn care as they may not be able to pay out of pocket and will prefer to patronise traditional birth attendant when pregnant or when their babies become sick.[18]

The most common presenting complaints reported in this study was convulsion, which is similar to a previous study in Port Harcourt and two other African studies but differs from Ifezulike et al, who reported delayed developmental milestone as the common presenting complaints.[8,13,19,20] This was however second most common presenting complaint in this study.

In our study epilepsy, Post CNS infections and cerebral palsy were the predominant neurological disorders recorded, a finding that agrees with Frank-Briggs and Alikor in Port Harcourt and Ejeliogu and Yiltok, in Jos, both in Nigeria, but varies from finding by Ifezulike et al that reported cerebral palsy as the most common neurological disorder in children.[6,8,13] Similarly, a study in Eritrea reported epilepsy, cerebral palsy, and post - CNS infections as the most common neurological diseases among children.[12]

Although disorders like autism spectrum disorder and attention deficit, hyperactive disorder and other neurodevelopmental disorders were less prevalent in our study, they are however, increasingly being recognized. This may be due to better awareness and diagnostic acumen. This finding is in contracts with report by West et al that reported autism spectrum disorder and ADHD as the second and third most prevalent neurological disorders in their study with seizure disorder as the most common.[1]

This study recorded multiple neurological disorders among 33.0% of the children a finding that is comparable to Ejeliogu et al and Ogbe et al.[6,12] It is possible that these children may have also had multiple risk factors such as perinatal asphyxia, CNS infections and neonatal jaundice. These aetiological factors have been linked to multiple neurological sequalae in developing countries.[6]

The risk factors for neurological disorders in this study were mainly preventable and they include birth asphyxia, CNS infections, neonatal jaundice and prematurity, a finding that is similar to previous studies in Nigeria and India.[6,8,21] In addition to the aforementioned risk factors, Kumar et al reported consanguinity and family history of neurological disorder as other aetiological factors.[21] Similarly, West and Aitafo reported perinatal asphyxia as the most common risk factor to neurological disorders in Rivers State in a study carried out in a private hospital setting.[1]

The predominance of perinatal asphyxia as an aetiological factor in these studies highlights the persistent gaps in obstetric and new-born care in developing countries. These gaps include poor antenatal attendance, poor intra-partum monitoring, limited access to skilled birth attendance and delayed intervention during emergencies. This shows that more needs to be done to improve perinatal outcomes and other preventable risk factors in Nigeria.

In this study, there were cases where the risk factors were either unidentified or could be attributed to chromosomal abnormalities or genetic disorders. These include cases such as Down syndrome, muscular dystrophy, and congenital anomalies of the CNS, among others. Although these cases were few in this study, a finding that agrees with previous works.[6,22]

It is important to note the challenges faced by these patients. First, the diagnostic technologies needed to establish an accurate and definitive diagnosis are not readily available. Secondly, where such services exist, they are quite expensive and not affordable for most of the parents to pay out of pocket, thus the low prevalence could be due to these challenges.[6,22]

Limitations

Being a retrospective study there were some incomplete or missing information in some patients record and such patients were excluded from the study.

CONCLUSION

The spectrum of neurological disorder in children attending UPTH is similar to previous works; with epilepsy, CNS infections and cerebral palsy as the most common disorders identified. The risk factors are mostly preventable and requires improving maternal, newborn and child care while creating awareness on these risk factors and how they can be prevented among the populace.

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