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PREVALENCE AND PATTERN OF PAEDIATRIC NEUROLOGICAL DISORDERS MANAGED IN OUTPATIENT PHYSIOTHERAPY CLINICS IN KANO

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ABSTRACT
Neurological disorders are among the major causes of physical disability in children. The aim of this study was to investigate the prevalence and pattern of Paediatric Neurological Disorders (PNDs) managed in outpatient Physiotherapy clinics in Kano. The 10-year retrospective descriptive study collected relevant data on PNDs from case files of the children who have been managed in Physiotherapy clinics of the 5 major referral hospitals in Kano using a data capture form. The population of children in Kano State based on the 2006 Census and the projected population for 2017 was obtained from the National Population Commission, Kano State office. The data obtained was analysed with descriptive statistics of mean, standard deviation, frequency and percentage. Data analysis was done using Microsoft excel and SPSS version 20. Results showed that 1927 paediatric cases were analysed out of which PNDs accounted for 1618 (83.96%). The mean age of the children at the time of their first treatment visit was 3.13 years ± 3.04 years (range =33days-12years). Most of the children with PNDs are males 1101(57.1%), with male to female ratio of 1.3:1. The Prevalence of PNDs in Kano was 0.257/1000 (i.e. 25.7/100,000). The most common PND that was managed by physiotherapists in Kano State was cerebral palsy which has a prevalence of 0.106/1000 (i.e.10.6/100,000), (proportion = 41.16%). It was concluded that PNDs are the most common paediatric cases managed by physiotherapists in Kano State with cerebral palsy having higher prevalence
Key words: prevalence, paediatric, neurological disorders, physiotherapy

INTRODUCTION

Neurological disorders are among the main causes of physical and mental disability, leading to limitations in the ability to perform wide variety of daily activities, including self-care, social interactions, mobility and communication (Raggi *et al.,* 2015). The burden of neurological disability is more severe among children from low income countries (Kawakatsu *et al.,* 2012) probably due to inadequate facilities or personnel in various relevant disciplines (Ofovwe and Ibadin, 2007) or owing to late presentation at the hospital (Frank-Briggs and Alikor, 2011). The management of Pediatric Neurological Disorders (PNDs) can be very expensive (Ofovwe and Ibadin, 2007) especially those PNDs that are chronic, progressive or lifelong (Canadian Institute for Health Information, 2007). Studies have shown that epilepsy, headache, stroke and intervertebral disc disorder are the common neurological disorders in adults (Onwuekwe and Ezeala-Adikaibe, 2011; Tegueu *et al*., 2013). On the other hand, the common PNDs managed in the medical outpatient paediatric units are Cerebral Palsy (CP) 19.3-55.3%, epilepsy 24.6-30.3% (Ogbe *et al.,* 2006; Ofovwe and Ibadin, 2007; Wammanda *et al.,* 2007; Frank-Briggs and Alikor, 2011), central nervous system (CNS) infection 5.5-9.5% (Ofovwe and Ibadin, 2007; Wammanda *et al.,* 2007; Frank-Briggs and Alikor, 2011) and speech and language problems (Ogbe *et al.,* 2006; Ofovwe and Ibadin, 2007). The PNDs that are commonly managed in the outpatient Physiotherapy clinics include CP 43.6-50.3%, traumatic sciatic nerve injury 22.4-35.5%, obstetric brachial plexus injury 8.9-13.3%, neurological sequelae of CNS infections 5.7-8.1%, radial nerve palsy 0.4-1.6% and facial nerve palsy 0.4-1.6% (Peters *et al.,* 2008; Adelugba *et al.,* 2011; Omole *et al.,* 2013). Other conditions include: Down's syndrome 1.4-2.2% (Peters *et al.,* 2008; Omole *et al.,* 2013), head injury, 1.4-1.6%, and spinal bifida cystica 0.7-0.8% (Adelugba *et al.,* 2011; Omole *et al.,* 2013).

The Management of PNDs involves multidisciplinary team approach with Physiotherapist being an important member of the team (Peters *et al.,* 2008). PNDs amenable to Physiotherapy management are usually associated with motor impairments that include muscle weakness, abnormal muscle tone, decrease in joint range of motion, balance and coordination (Peters *et al.,* 2008; Omole *et al.,* 2013) and in most cases, referral for rehabilitation could be due to delayed developmental milestone and inability to walk (Wammanda *et al.,* 2007).

Regular evaluation of the prevalence and pattern of PNDs can be used to plan for future health service needs, allocate health care resources for the management of these disorders (Ofovwe and Ibadin, 2007; Danila *et al*., 2014), prioritize research expenditures, and raise public awareness about the impact of specific PNDs (Danila *et al*., 2014). Presently, there is paucity of published data on the pattern of the PNDs managed in outpatient Physiotherapy Clinics in Northern part of Nigeria. The aim of this study was to assess the prevalence and pattern of PNDs in Kano metropolis.

MATERIALS AND METHODS

The study was a 10-year retrospective descriptive survey. The case files of paediatric patients managed between 1st April, 2007 and 1st April, 2017 in the out-patient Physiotherapy Clinics of Aminu Kano Teaching Hospital (AKTH), Murtala Muhammad Specialist Hospital (MMSH), Mohammad Abdullahi Wase Specialist Hospital (MAWSH), and Hasiya Bayero Paediatrics Hospital (HBPH) were reviewed. Ethical approvals were obtained from the ethics committees of Aminu Kano Teaching Hospital (NHREC/21/08/2008/AKTH/EC/2030) and Kano State Ministry of Health for MMSH, MAWSH and HBWCH (MOH/OFF/797/T.I/384). The population of children in Kano State was obtained from the National Population Commission (NPC), Kano branch office (ref: NPC/OR/S/C/352). Relevant patient case files were obtained from the health record units and the following information were obtained: child's age, date of first treatment, diagnosis/impression, sex, date of onset of the condition, aetiology/risk factors, time between onset of disorder and commencement of physiotherapy and sources of referral.

Assessment of the proportion and prevalence of PND

1. Proportion of non-neurologic cases =

$$\frac{\text{Total number of the non-neurologic disorders} \times 100}{\text{Total number of paediatric cases managed}}$$

2. Proportion of neurologic cases =

$$\frac{\text{Total number of PND cases} \times 100}{\text{Total number of paediatric cases managed}}$$

Frequentist method was used for the determination of the prevalence of PNDs per 1000 of the population of children in Kano (Oskoui *et al.,* 2013).

3. Prevalence of PND =

$$\frac{\text{Total number of PND cases} \times 1000}{\text{Total population of children in Kano State}}$$ (Oskoui *et al.,* 2013)

Data analysis

The data was analysed using descriptive statistics of mean ± standard deviation, frequency and percentage using SPSS version 20.0 and Microsoft excel.

RESULTS

Socio-demographic characteristics of participants

The data of 1927 paediatric cases were analysed. The mean age of the children was 3.13 years ± 3.04 years (range = 33days - 12years). Majority of the children are males 57.1% (n=1101), while females accounted for 42.9% (n=826). PNDs accounted for 1618 cases (83.96%) in which males constituted 57.4% (n=928) and females constituted 42.6% (n=690) with male to female ratio of 1.3:1 for PND (table 1). The time taken from the onset of the illness to the commencement of Physiotherapy is 15months ±19.8month (range = 3 days to 3 years).

In this study non-neurological disorders accounted for 309 out of 1927 paediatric cases which gave a proportion of 16.04%. Majority of the non-neurological disorders are orthopaedic 6.49% (n=125) and soft tissue and plastic 6.02% (n=116) cases.

Pattern of PNDs

The most common PND in Kano metropolis is cerebral palsy (CP) with 41.16% (n=666), this was followed by delayed milestone 19.96% (n=323), and hemiplegia 7.85(n=127) as presented in table 2.

Prevalence of PNDs in Kano

The total projected population of the children in Kano who are aged 0-14years was 6,288,321 for year 2017 based on the data obtained from the NPC, Kano State Office. This gave the prevalence of PNDs in Kano as 0.257 per 1000 of the population (i.e. 25.7/100,000) based on the projected figures. The prevalence of CP in Kano metropolis was 0.106 per 1000 of population (i.e.10.6/100,000) based on the projected figures as presented in (table 3).

Table 1: Gender distribution for other paediatric disorders

Condition	Male n (%)	Female n (%)	Total n (%)
PNDs	928(57.4)	690(42.6)	1618(100)
Non-neurological disorders			
Orthopaedic	67(53.6)	58(46.4)	125(100)
Cases with unknown diagnosis	37(56.92)	28(43.08)	65(100)
Cardiopulmonary	2(66.7)	1(33.3)	3(100)
Soft tissue	67(57.85)	49(42.2)	116(100)
Total	1101(57.1)	826(42.9)	1927(100)

PNDs= Paediatric Neurological Disorders

Table 2: Pattern of paediatric neurological disorders managed by physiotherapists in Kano metropolis

Neurological conditions	Frequency	Percent
Paralysis of unspecified diagnosis	20	1.24
Poliomyelitis	11	0.68
Measles	10	0.62
CP	666	41.20
Downs syndrome	38	2.35
Paraplegia	30	1.85
Delayed milestone	323	20.00
Pott's diseases	11	0.68
Facial Nerve palsy	41	2.53
Meningitis	86	5.32
Hemiplegia^{+}	127	7.85
Cerebral malaria	68	4.20
Sciatic nerve palsy	76	4.70
Erb's palsy	31	1.92
Spina bifida	20	1.24
Head injury	15	0.93
Hydrocephalus	15	0.93
Other Peripheral nerve palsies	11	0.68
Guillein barre syndrome	6	0.37
Other neurological disorders*	13	0.80
Total	1618	100

CP= Cerebral palsy, $^{+}$the causes of hemiplegia presented above were not properly documented in patient case files as hemiplegia can arise from CP, meningitis, head injury, stroke or sickle cell disease. ***others disorders include: severe fatigue =1case, psychiatric disorder with muscle weakness =3cases, faecal incontinence =2 cases, Crouson's syndrome =1 case, aphasia=1case, William's syndrome =1case and seizure with muscle weakness =4 cases

Table 3: **Prevalence of PNDs in Kano State**

S/N	Neurological conditions	Frequency	Prevalence per 1000 of population based on 2006 Census*	Prevalence per 1000 of population (based on 2017 population projection)+	Prevalence per 100,000 of population (2017 projection)
1	Paralysis of unspecified	20	0.0045	0.0032	0.32
2	Poliomyelitis	11	0.0025	0.0017	0.17
3	Measles	10	0.0023	0.0016	0.16
4	CP	666	0.1506	0.1059	10.59
5	Downs syndrome	38	0.0086	0.0060	0.6
6	Paraplegia	30	0.0068	0.0048	0.48
7	Delayed milestone	323	0.0730	0.0514	5.14
8	Pott's diseases	11	0.0025	0.0017	0.17
9	Facial Nerve palsy	41	0.0093	0.0065	0.65
10	Meningitis	86	0.0194	0.0137	1.37
11	Hemiplegia+	127	0.0287	0.0202	2.02
12	Cerebral malaria	68	0.0154	0.0108	1.08
13	Sciatic nerve palsy	76	0.0172	0.0121	1.21
14	Erb's palsy	31	0.0070	0.0049	0.49
15	Spina bifida	20	0.0045	0.0032	0.32
16	Head injury	15	0.0034	0.0024	0.24
17	Hydrocephalus	15	0.0034	0.0024	0.24
18	Other Peripheral nerve palsies	11	0.0025	0.0017	0.17
19	Guillein barre syndrome	6	0.0014	0.0010	0.10
20	Other neurological disorders*	13	0.0029	0.0021	0.21
	Total PND	1618	0.3659	0.2573	25.73

CP= Cerebral palsy *The population of children in Kano aged 0-14 years based on 2006 census was 4,422,452. +the projected population of children for 2017 was 6, 288, 321.

DISCUSSION

Neurological conditions are among the main causes of physical and mental disability, leading to impairments at the level of different body functions (Raggi *et al.,* 2015). It was observed in this study that male children had more PND than their female counterparts with male to female ratio of 1.3:1. This finding was interestingly the same with the outcome of prior studies in this area where it was found that male to female of 1.3:1 remain constant over the years (Peters *et al.,* 2008; Lagunju and Okafor 2009; Adelugba *et al.,* 2011) though higher male to female rations of up to 1.5:1 have however been reported in other studies (Wammanda *et al.,* 2007; Frank-Briggs and Alikor, 2011; Omole *et al.,* 2013).

In addition, this study found that PNDs accounted for over eighty percent (83.96%) of the paediatric conditions managed by physiotherapists in Kano State within the last 10 years. This finding has confirmed the statement that paediatric neurological conditions are major workloads for Physiotherapy and rehabilitation in Nigeria (Omole *et al.,* 2013). Studies have similarly reported that PNDs were the most common disorders that accounted for 83.6% of paediatric disorders (Peters *et al.,* 2008). High proportions of 71.7% and 72.9% were also reported by Omole *et al.* (2013) and Adelugba *et al.* (2011) respectively. Lower prevalence of 6.7 and 21.0% have however been reported by the studies conducted in paediatric clinics by Frank-Briggs and Alikor, (2011) and Lagunju and Okafor (2009) respectively. The possible reason for the high prevalence of neurological cases that are managed by physiotherapists could be because most of the paediatric cases referred for rehabilitation usually manifest with muscle weakness, delayed ability to achieve the required developmental milestone, abnormal muscle tone, decreased balance and coordination and reduced joint range of motion which are mostly associated with motor

impairment due to neural pathology. This study observed that the PND with the highest proportion is CP with 41.20%. This was followed by delayed milestone, hemiplegia, meningitis and sciatic nerve palsy in that order. CP cases are common in this study probably because among all the paediatric conditions, parents tend to be more proactive in taking children promptly to the hospital when there is obvious weakness that leads to the inability to hold their head erect, sit, stand or walk and in most cases the diagnosis of CP is usually made. Studies have also reported that CP cases accounted for 43.7%, 43.6%, 44.1% and 55.3% by Peters *et al.* (2008) Adelugba *et al.* (2011) Lagunju and Okafor (2009) and Wammanda *et al.* (2007) respectively.

The prevalence of PND based on 2006 Census and the projected 2017 population values are 0.366 and 0.257 per 1000 of the population of children of Kano respectively. Though the total number of PND is the same in both cases, but prevalence values differ due to the projected 1.42 fold increase in the total population of children in Kano without the corresponding projected increase in the number of children with CP. The implication of this finding is that, though total number of cases of PND may remain constant over the years; however, significant increase in the target population may show reduction in prevalence rate as observed in this study. This could be a limitation of the frequentist approach. In contrast to the findings of this research, a study reported that the prevalence of PND in Western Kenya was 29/1000 (Kawakatsu *et al.,* 2012) and another reported 61/1000 in the rural district of Kenya (Mung'ala-Odera *et al.,* 2006). The possible difference in prevalence of PND between this study and those conducted in Kenya could be due to differences in population of people. Prevalence tends to be high in places with low population and the entire population of Western Kenya is 4.334 million (2009 Census) whereas the projected 2017 population of children alone in Kano State is over 6.288 million.

Finally the prevalence of CP is 0.150/1000 based on 2006 Census and 0.106/1000 based on the projected 2017 population of children alone in Kano state. Higher prevalence rate has been reported in an African community in which physical impairments accounting for 5/1000 (Kawakatsu *et al.,* 2012).

CONCLUSION

It was concluded that neurological disorders are the most common paediatric cases managed by physiotherapists in Kano metropolis with CP having higher prevalence. The average time taken from the onset of the illness to the commencement of paediatric physiotherapy is 15months. The prevalence of PND is 0.257/1000 (i.e. 25.7/100,000) and that of CP is 0.106/1000 (i.e. 10.6/100,000) based on the projected 2017 population of children in Kano State.

Authors' contributions

All the authors have contributed equally in the design of the research, data collection and management, research report and proof reading.

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