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Pattern of Musculoskeletal Affectation among Poliomyelitic Patients in Kano, Nigeria

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Abstract

Background: *Poliomyelitis is a contagious and infectious disease caused by the polio virus. The disease has been eradicated from developed countries but still remains one of the most crippling diseases affecting children in the third world countries particularly in Nigeria. The purpose of this study was to determine the pattern of musculoskeletal affectation among polio patients in Kano metropolis with the aim of providing data that will help enhance and/or develop new rehabilitation strategies in the management of post polio syndrome.*

Setting: *All rehabilitation clinics in selected hospitals; NOHD, MMSH, MAWSH and AKTH in Kano.*

Participants: *Fifty patients (22 males and 28 females) with specific musculoskeletal affectations ranging from mild muscular atrophy and limb shortening to severe fixed flexion deformities involving the hip, knee and ankle joints were assessed in the study.*

Materials: *Standard clinical tools; the goniometer used to assess the range of motion and the tape rule to measure degree of atrophy and limb length discrepancy and a scale; Medical Research Council muscle grading scale (MRC) to assess the muscle power.*

Results: *Data collected was analyzed descriptively and inferentially using the statistical package for the social sciences (SPSS 15.0). The study showed that gender had no significant effect on the pattern of musculoskeletal affectation at (χ^2 =2.402, p≤0.05). The study showed Fixed Flexion Deformity (FFD) of either the hip, knee or ankle joints accounted for 37(74.0%), limb length discrepancy on the other hand accounted for 47(94.00%), atrophy of the thigh muscles 47(94.0%) and atrophy of the calf muscles 46 (92.0%) of the total. The muscle power varied in each muscle group assessed ranging from (0 – 3) in general. the participants ranging from a flicker of movement, to movement of the limb against resistance.*

Conclusion: *Poliomyelitis is a disabling disease affecting both males and females with equal distribution, majority of patient presents with lower limb affectation. Fixed Flexion Deformity compromised range of movement mostly of the knee and ankle joints of participants while only a few had that of the hip joint.*

INTRODUCTION

Poliomyelitis (polio) is a highly infectious viral disease, which mainly affects young children. The virus is transmitted through contaminated food and water, and multiplies in the intestine, from where it can invade the nervous system[1]. Many infected people have no symptoms, but do excrete the virus in their faeces, hence transmitting infection to others.

Initial symptoms of polio include fever, fatigue, headache, vomiting, stiffness in the neck, and pain in the limbs. In a small proportion of cases, the disease causes paralysis, which is often permanent. Polio can only be prevented by immunization. Poliomyelitis is a viral disease that can affect nerves and can lead to partial or full paralysis. Although, there has been a global concerted effort to eradicate polio, the disease still remains endemic in countries such as Nigeria, Afghanistan, Pakistan and India (CDC, 2005).polio virus is most recognized for its destruction of the nervous system causing paralysis[1]. Polio epidemics have crippled thousands of people, mostly young children. The disease has caused paralysis and death for much of human history. Epidemics of paralytic poliomyelitis in the developing countries of the tropics and subtropics have, in fact, shown a threefold increase in the past decade and are continuing to increase [2]. In 1988, the WHO resolved to eradicate polio in all 46 countries in Africa, but the implementation of recommended polio eradication strategies in the majority of countries in the region did not begin until 1995. By 2003, 44 of the 46 countries in the region had interrupted indigenous wild polio virus (WPV) transmission and were no longer considered polio endemic. Polio cases had reduced from 4331 cases in 1998 to 446 in 2003[3]. During all these years Nigeria had uninterrupted polio transmission. In 2003 to 2004, Nigeria experienced resurgence in wild polio virus transmission, after a loss of public confidence in oral polio vaccine (OPV) and suspension of supplementary immunization activities (SIA's) in certain Northern States, particularly Kano[4]. In 2006, with a population of approximately 140 million, Nigeria had the largest number of polio cases of about 1,129 out of 2002 cases worldwide (56%) of cases. In 2008, 805 cases of wild polio virus were reported in Nigeria following the resumption of immunization[5].

Pain, fatigue, weakness as well as paralysis and atrophy with resultant limb shortening and decreased range of motion have been shown to be the determinants of the degree of deformity in polio patients, which results in reduced endurance and can significantly impair an individuals' ability to function in daily life[6]. The sites most commonly affected by the paralysis were the plantar fascia, the tendon achillis, the ilio-tibial band, the hamstrings, and the lumbosacral fascia and periarticular ligaments. The less affected sites were the infrapatella tendons, the pectoral muscles, teres major and pronator teres. Deformities of the limbs and trunk, and in particular the lower limbs, develop in most children who do not receive adequate treatment from the onset of the disease. Many deformities

could be avoided or kept to a minimum, by the application of proper secondary prevention at the acute and recovery stages. Muscle contractures will limit or block joint movements, and can result in axial deviation (e.g. valgus deformity of the knee). Some deformities may arise early in the acute stage of the disease. Other deformities occur at the later stage of the disease and were mainly caused by muscle imbalance, gravity acting on the affected part of the body and maintaining an unfavorable condition for a long time[7]. Deformities seriously aggravate the consequences of paralysis, their harmful effect especially being apparent in locomotion. Even though, the multiplicity and severity of muscle and joint affectation in polio victims may translate into a major economic burden its pattern have still not been addressed in Kano, Nigeria.

MATERIALS AND METHOD

Design

This is an observational study aimed at finding out pattern of musculoskeletal affectation in patients with poliomyelitis.

Participants

Fifty participants were selected from standard rehabilitation clinics in Kano; Aminu Kano Teaching Hospital, National Orthopedic Hospital Dala, Murtala Muhammad Specialists Hospital and Muhammad Abdullahi Wase Specialist Hospital, Nassarawa. This included all male and female patients with musculoskeletal affectation due to poliomyelitis infection as noted in their case files. All participants signed consent forms prior to commencement of any assessment.

Materials

Standard clinical tools were used to assess the level of musculoskeletal involvement. The Goniometer (6160B, Plastic 12" Goniometer 360^0 model, made in USA); was used to assess range of joint motion among participants. For the assessment of muscle girth and level of shortening at the lower limbs an inelastic tape rule (Butterfly brand, made in China) was used. The Medical research council clinical grading scale was used for assessment of muscle power and case files provided the patients bio-data and a comprehensive history of the condition to confirm the diagnosis.

Procedure

The study commenced by going through each patients file to obtain bio-data and comprehensive clinical history to confirm the diagnosis. Thereafter, measurements and assessments of the affected parts were carried out using standardized tools as follows:

Measurement of Joint Range of Motion

The participant's range of joint motion was assessed using a standard goniometer. Each participant was placed at an appropriate position relevant for the assessment of the body parts (). Detailed positioning protocols for goniometric assessment of different body parts have been described elsewhere[8]. Following assessments participants were classified on the basis of available range of motion and extent of fixed flexion deformity (F.F.D) at the hip, knee and ankle joints as follows:

Assessment of Muscle Group Power

The gross muscle power of the neck, trunk and limb muscles of the participants was determined and graded using the medical research council clinical grading scale. In the assessment of muscle power, the participants were put in a comfortable and stable position, which was determined by the muscle group to be graded.

Measurement of Limb Length Discrepancy and Severity of Atrophy

The tape rule was used to measure limb length discrepancy from anteriosuperior iliac spine of one side of the pelvic bone to the medial malleolus of the foot of the same side and also the level of atrophy or wasting was assessed using specific bony land marks[9].

Measurements for severity of the atrophy of the thigh muscles were taken from the anterior superior iliac spine to the mid thigh and then the circumference measured at that point, for the calf muscles measurements were taken from the distal end of the patella to the mid portion of the calf then the circumference at that point was measured[10].

Data Analysis

Data was expressed in the form of descriptive and inferential statistics. The pattern of anatomic involvement was expressed in terms of frequencies and percentages of parts affected. Similarly the gender distribution of deformities in participants was equally expressed in terms of frequencies and percentages. To determine the gender that more musculoskeletal affectation chi-square was used.

RESULTS

A total of 50 subjects participated in this study, 22 males and 28 females, all 50 participants presented with lower limb (musculoskeletal) affectation. Only 2 had upper limb involvement, 36(72%) of the participants were aged 1-5years, while 13(26%) were aged 6-10years, and only 1(2%) was above 10years. The findings from the study are presented in the tables below.

Table 1: Gender distribution of lower limb sequel in polio affected patients

Limb	**Gender n(%)**	
	Male	Female
Left	5(22.7)	9(32.1)
Right	6(27.3)	11(39.3)
Right and left	11(50.0)	8(28.6)
Total	22(44)	28(56)

n=number, %=percentage

Table 1 indicates that the side affected in males are 5(22.7%) left, 6(27.3%) right and 11(50.0%) both right and left lower limb. For females 9(32.1%) left, 11(39.3%) right and 8(28.6%) had both right and left lower limbs affected.

Table 2: Segmental body part sequel among polio patients

Body part	Distribution	
	Affected n(%)	Unaffected n(%)
Neck	0(0)	0(0)
Trunk	41(82)	9(18)
Scapular	2(4)	48(96)
Shoulder	2(4)	48(96)
Forearm	2(4)	48(96)
Wrist	2(4)	48(96)
Fingers	2(4)	48(96)
Hip	44(88)	6(12)
Knee	50(100)	0(0)
Ankle	50(100)	0(0)
Foot	50(100)	0(0)
Toes	50(100)	0(0)
Hallux	50(100)	0(0)

n= number, %=percentage

Table 2 presents the segmental body part sequel in frequencies and percentages. It indicates that out of the 50 participants, none had neck affectation (0%), 41(82%) trunk affectation, 44(88%) hip affectation and each participant presented with knee, ankle, foot, toe and hallux affectation accounting for 50(100%) each and 1(2%) had upper limb affectation .

Table 3: Degree of fixed flexion deformity at the hip, knee and ankle joints

Joint		Normal	Mild	Moderate	Severe
		n (%)	n (%)	n (%)	n (%)
Hip	Right	45(90)	0(0)	2(4)	3(6)
	Left	44(88)	0(0)	2(4)	4(8)
Knee	Right	41(82)	0(0)	0(0)	9(18)
	Left	35(70)	1(2)	2(4)	12(24)
Ankle	Right PF	30(76)	1(2)	11(22)	0(0)
	Right DF	24(48)	8(16)	7(14)	11(22)
	Left PF	45(90)	3(6)	2(4)	0(0)
	Left DF	45(90)	4(8)	1(2)	0(0)

n=number, %=percentage

Table 3 shows that over 44(88.0%) of the participants had full range of motion (ROM) and over 5(10.0%) presented with fixed flexion deformity (FFD) at the hip. Over 38(76.0%) had full ROM and about 12(24.0%) presented with a FFD at the knee joint. 36(72.0%) of participants presented with full ROM and 12(24.0%) with FFD of the ankle joint.

Table 4: Gender distribution of muscle power at right lower limb among participants

Grading of muscle power		Gross muscle power in lower limb affectation n(%)	
		RIGHT	LEFT
	1	4(18.2)	4(14.3)
	2	6(27.3)	9(32.1)
	3	7(31.8)	5(17.9)
	4	1(4.5)	2(7.1)
	5	4(18.2)	8(28.6)

n=number, %=percentage

Table 4 shows 4(18.2%) and 4(14.3%) of the male and female participants respectively presented with a flicker of movement at the affected limb, 6(27.3%) and 9(32.1%) of the male and females respectively presented with movement of the limb only in a gravity eliminated position, 7(31.8%) and 5(17.9%) of the male and female respectively presented with movement of the limb against gravity, 1(4.5%) and 2(7.1%) of the male and female respectively also presented with movement of the limb against gravity with added resistance and 4(18.2%) and 8(28.6%) of the male and females had normal limb movement.

DISCUSSION

The objective of the present study was to find out the pattern of musculoskeletal affectation among polio patients in Kano metropolis. The outcome of the study indicated that majority of polio patients presented with trunk 41(82.0%) and lower limb 50(100%) affectation which was about 25 times that of upper limb affectation 2(4.0%), similar to the findings of other studies that revealed lower limb involvement was 26 times more than that of the upper limb in one study and contrary to another study that revealed 4 times more[11]. None of the cases in this study presented with neck affectation. However, Studies indicate that neck affectation comprises about 2% of cases of paralytic polio, destruction of nerves in this region results in weakness of the muscles supplied by the cranial nerves, producing symptoms of encephalitis, and causes difficulty breathing, speaking and swallowing. Critical nerves affected are the glossopharyngeal nerve, which partially controls swallowing and functions in the throat, tongue movement and taste; the vagus nerve, which sends signals to the heart, intestines, and

lungs; and the accessory nerve, which controls upper neck movement. Due to the effect on swallowing, secretions of mucus may build up in the airway causing suffocation. Therefore patients die before presentation at the chronic stage[12]. Thus the involvement of respiratory muscles could not be ascertained which was in keeping with another study conducted in western Nigeria. The study also indicated that the distribution of the musculoskeletal affectations examined was independent of the gender of the participants i.e. either male or female had equal chance of having the affectation.

The results also revealed that over 38(76.0%) of the patients did not present with a fixed flexion deformity (FFD) at either the hip, knee or ankle joints. However, the same number 12(24.0%) of patients presented with fixed flexion deformity at the knee and ankle joints, and 5(10.0%) had fixed flexion deformity of the hip joint. This was contrary to another study that revealed majority of patients had FFD at the hip, followed by the knee then the ankle joints[13].Findings from this study differed from that of other studies because of variation in the perception of the disease condition due to cultural differences, ethnicity, awareness of the contraindications (mobilization during acute phase), time of arrival at the hospital and the management approach to the affected patients.

In the present study limb length discrepancy accounted for about 49(98.0%) which is almost similar to another study carried out by Khare, Agarwal and Kumar in 2007 which revealed that 71.4% of patients presented with limb shortening. This difference might not be unconnected to the fact that the characteristics and diversity of the population of the studied sample varied from that of this study.

Out the fifty studied cases bilateral lower limb affectation represented the highest percentage of limb involvement, followed by unilateral lower limb, and unilateral upper limb affectation in only two patients, similar to findings of another study conducted in western Nigeria in 1982 by Oyemade[14]. It was also contrary to findings from another study conducted in India by Nityananda in 2002; Which reported that unilateral lower limb affection had the highest percentage of representation in the cases studied, followed by unilateral upper limb, bilateral lower limb, all four limbs, unilateral upper and lower limb and both upper limb affectations. The findings from this study differed from that of Nityananda, because he studied the pattern of locomotor disabilities, though poliomyelitis accounted for about 45% of the studied cases and about 81% of the total paralytic cases affecting the limbs. The difference might be attributed to other conditions such as congenital deformity, congenital limb deficiency, post traumatic stiffness, amputation, spasticity and others that were studied along with poliomyelitis in the research.

Results also showed that participants with right lower limb affectation presented majorly with a muscle power that allowed them to move in gravity eliminated position (power 2). Furthermore, those with left lower limb involvement presented majorly with a power that

allowed them to move against gravity (power 3). The focus of the study conducted by Oyemade in 1982 was on the power of individual muscle groups rather than on the gross muscle power of the entire limb examined. The study revealed that the quadriceps muscle was mostly affected, while the gluteus maximus was the least affected in the lower limbs. The findings of the present study however, which focused on the gross muscle power of the limb suggests that the right lower limb is mostly weaker as compared to the left lower limb of participants. Therefore the present study and that conducted by Oyemade cannot be compared due to differences in the mode of data collection using the MRC clinical grading scale.

There is need for further studies to be carried out on a larger population to determine the pattern of musculoskeletal affectation as well as deformity, and the effect it has on the quality of life of the affected individuals with the view to its eradication as well as alleviation of suffering of those that are already affected.

REFERENCES

1. World Health Organization Report (2004c). Wild Poliovirus Transmission in Africa region. An Update. Communicable diseases epidemiological Report. Available at http://www.google.com (Retrieved on 21st May, 2010).
2. World health organization (2004a). As polio immunizations resume in Kano, Nigeria, Africa launches largest ever polio campaign. Polio news; 22. Available at http://www.polioeradication.org. (Retrieved on 21st May, 2010).
3. World Health Organization Report. (2004b). Eradication of Poliomyelitis. Available at http://www.google.com (Retrieved on 21st May, 2010).
4. A. Toriola and Bello. B (2010). Prevalence of paralytic poliomyelitis in Kano, Nigeria (2001 – 2007). Gazzetta medica italiana archivio per le scienze mediche; 169(5): 1-2.
5. Dean, E., Agboatwalla, w.,Akram, dallimoore, M., &Habib. (1999). Poliomyelitis; Revised principles of management. Physiotherapy. 81(1), 18-19.
6. Krol, J. (1993). Techniques from the district hospital. World health organization: Geneva.
7. Cuccurullo, S.J. (2004). Physical Medicine and Rehabilitation Broad Review. Demos Medical Publishing.
8. Johnson, P.H. (2000). Physical Therapist Clinical Companion. London: Springhous
9. International society for the Advancement of Kinanthropometry (2000).
10. Agarwal, A.K., & Goel, M.K. (1978). Problems in the Rehabilitation of Physically Disabled in Rural India. Journal of Prosthetics & Orthotics International, 2: 27-29.
11. Atkinson, W., Hamborsky, J., McInbyre,L., & wolfe, S. (eds). (2007). Poliomyelitis. Epidemiology and Prevention of Vaccine, preventable

diseases (the pink book) (10th edn). Washington DC: public health foundation.

12. Khare, R., Agarwal, A.K, and Kumar, R. (2007). Polio Rehabilitation Surgery camp. IJPMR. 18(1), 21 – 23.
13. Oyemade, G. A. A. (1982). Contracture Patterns in Poliomyelitis Among Ibadan Children. Journal of Tropical Pediatrics. 28.
14. Okonko, J.O., Babalola, E.T., Adedeji, A.O., Onoja, B.A., Ogun, A.A., Nkong, A.O. and Adu, F.D.(2008). Biotechnology and Molecular Biology Reviews, 3(6): 135-147.