International Journal of Contemporary Pediatrics
Fafolahan AO et al. Int J Contemp Pediatr. 2022 Oct;9(10):955-959
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20222426

Case Report

Pediatric rehabilitation post Guillain-Barré syndrome: a case report at Federal Medical Centre, Abeokuta

Abiola O. Fafolahan[1]*, Taiwo O. Olatunji[1], Abigail O. Davis[1], Oladunni P. Sodipo[1], Kafayat K. Adeoye[1], Badiru O. Musa[1], Olakorede David[1], Erioluwa Jegede[1], Titilope Musari[1], Blessing O. Adeyemi[1], Ebunoluwa M. Obadeji[2]

[1]Pediatric Unit, Department of Physiotherapy, Federal Medical Centre, Abeokuta, Nigeria
[2]Department of Physiotherapy, Faculty of Basic Medical Sciences, Obafemi Awolowo University, Ile Ife, Nigeria

Received: 09 August 2022
Revised: 05 September 2022
Accepted: 06 September 2022

***Correspondence:**
Dr. Abiola O. Fafolahan,
E-mail: defharfhoo7@gmail.com

ABSTRACT

Guillain-Barre syndrome (GBS), a lower motor neuron autoimmune disease, primarily damages the myelin sheaths of the peripheral nervous system. Around the world, it is the main cause of acute flaccid paralysis. This case study's aim was to outline the physical therapy interventions provided to a patient at the Federal Medical Center in Abeokuta (FMCA) who was diagnosed of GBS. An 8-year-old child who arrived at the children emergency unit complaining of weariness, a headache and difficulty walking. This patient had physiotherapy interventions, which included free active exercises for the upper and lower limbs, grip strengthening and passive movements to all joints. Resisted active exercises and bridging was also incorporated. Patient was able to do standing and walking re-education at week 5th and 10th week respectively. Following physical therapy rehabilitation, the patient demonstrated improvements with range of motion (ROM), strength, balance, ambulation and endurance. Early referral for physical therapy, clinical compliance, commitment to home programme exercises, and support from family were all proven to significantly improve recovery.

Keywords: Guillain- Barré syndrome, Pediatric rehabilitation, Case report, Abeokuta

INTRODUCTION

Acute or subacute onset of varied degrees of weakness in limbs or cranial nerve-innervated muscles, accompanying reduced or absent deep tendon reflexes and a distinctive profile in cerebrospinal fluid and electrodiagnostic investigations are all characteristics of GBS.[1] GBS is thought to be an immune-mediated process, resulting from the production of autoimmune antibodies and inflammatory cells that cross-react with epitopes on peripheral nerves and roots, causing demyelination, axonal damage or both.[2] The underlying etiology and pathophysiology of GBS are not fully understood, but they are believed to be immune-mediated processes.[3] The degree of the condition affects recovery, which can range from mild to severe cases. Even while only a small percentage of patients may need prolonged hospitalization, symptoms typically take 6 to 18 months to completely resolve.[4-6] With *Campylobacter jejuni*, *Cytomegalovirus* (CMV) and Epstein-Barr virus (EBV) often found and *C. jejuni* being by far the most prevalent, the link between GBS and antecedent infection has been thoroughly characterized.[7,8] It's interesting to note that GBS caused by *C. jejuni* may have a more severe clinical manifestation.[9]

According to reports, there are 0.6 to 2.4 occurrences per 100,000 people worldwide each year.[10-12] Men are

affected almost 1.5 times more frequently than women.[13] The majority of cases of acute inflammatory demyelinating polyradiculoneuropathy (AIDP), which accounts for nearly 90% of all cases occur in North America and Europe.[14] Axonal forms of GBS such as acute motor axonopathy (AMAN) and acute motor sensory axonopathy (AMSAN), are observed to account for 30% to 47% of cases in different parts of the world (Asia, Central and South America).[14,15] To the best of our knowledge, there don't seem to be as many studies on the Physiotherapy management of GBS. Consequently, this case report emphasizes the physiotherapy management of a case of GBS at Federal Medical Center, Abeokuta (FMCA).

We presented an unusual case of an 8-year-old child who presented with fatigue, headache and inability to walk at the children emergency ward.

CASE REPORT

Patient history

The patient, an 8-year-old lad from Nigeria, was admitted to our hospital's children's emergency ward after complaining of a headache and inability to walk three weeks prior to admission. According to reports, he quit attending school when the complaints began. There was no known aggravating and paracetamol was said to relieve the weakness. One week after the initial symptoms, he was taken to a private medical facility where he was kept for a short period of time, given various drugs (Neurovite forte, Augmentin, iron, multivitamin, folic acid), had blood tests and was then sent home the same day. A few days after being discharged, the patient developed a cough, generalized body weakness and a low voice which necessitated bringing him to the pediatric emergency ward. There was no prior history of gastroenteritis, a skin rash, an upper respiratory infection or trauma. The pregnancy, birth and postpartum periods went uneventful.

He was the last of 2nd child in a monogamous family. His vital signs at the time of admission were temperature=36.2 °C, pulse rate=122 beats per minute, respiratory rate=26 counts per minute, SpO_2=98. His short- and long-term memories were intact, he was conscious and his speech was low-pitched rather than slurred. He was also oriented in time, location and person. The patient was right-handed.

Full blood count (FBC), erythrocyte sedimentation rate (ESR), lumbar puncture (LP), electrolyte, urea and creatinine (E/U/CR) tests were performed upon admission at the children's emergency ward. Results of the FBC revealed thrombocytosis, white blood cells, ESR and E/U/CR were all normal. The biochemistry of the cerebrospinal fluid protein was slightly elevated. He was thereafter diagnosed of GBS and intravenous immunoglobin treatment was considered. He received the right treatment and discharged after clinical recovery was sustained. After being discharged, he had a brief session with a physiotherapist and was scheduled rehabilitation on outpatient basis.

The patient seemed to be a bright young boy who had to quit attending school when his symptoms began. He also ceased participating in football games with his friends. He was lively and had a great social life.

Physical examination at physiotherapy clinic after discharge

Patient was afebrile, acyanosed, anicteric and not experiencing any respiratory or painful discomfort when his father carried him into the clinic. Fatigue and an inability to walk were the primary complaints. Brudzinski was negative. Kerning was conflicted. The upper limbs (ULs)' muscle tone and reflexes were normal. Lower limbs (LLs) reflexes and muscle tone were diminished. No pain, numbness or paresthesia was present and sensations were intact. All extremities range of motion were limited, both passive and active. The grip strength was poor on both sides. Gross muscle strength reduced bilaterally in both ULs and LLs as determined by the Oxford grading system. GMP in ULs was 2. The muscle diagram for the lower limbs is shown in Table 1.

Table 1: Initial gross muscle power (GMP) according to Oxford muscle grading of the lower limbs.

GMP		Right	Left
Hip	Flexion	2	2
	Extension	2	2
	Abduction	2	2
	Adduction	2	2
Knee	Flexion	1	1
	Extension	2	2
Ankle	Dorsiflexion	2	2
	Plantarflexion	2	2

The patient required two people in all to help move around in the bed and transfer. The self-care, transfer and locomotion portion of the functional independence measure (FIM) was completed and patient scored 1 in all tested areas (Table 2). The FIM is a standard instrument that is used to objectively evaluate a patient's level of disability and treatment response.

Treatment plan and therapeutic intervention

Regaining function in the trunk, upper and lower extremities, improving activity tolerance and functional mobility were the key objectives of physical therapy. In accordance with the patient's family, our immediate goals were to strengthen the patient's weak ULs, LLs and trunk muscles in to prevent further physical deterioration. We intended to retain upper limb muscle strength, retrain balance, and improve walking in the medium term. We

intended to maintain balance and reintegrate patient back to community in the long term. The patient was seen by the pediatric physiotherapists twice a week (mondays and thursdays) and each appointment lasted between 25 and 45 minutes.

To accomplish the immediate goals, we began passive movements to all ULs and LLs joints, suspension therapy for both hamstrings, aided curl-up exercises and grip strengthening exercises.

Table 2: Functional independence scores throughout treatment.

Parameters	Initial	Week 4	Week 7	Week 10
Self-care				
Eating	1	2	5	6
Grooming	1	2	4	7
Bathing	1	2	3	6
Dressing-Upper	1	2	4	6
Dressing-Lower	1	2	4	6
Toileting	1	1	3	7
Transfers				
Bed, chair, wheelchair	1	2	4	6
Toilet	1	2	4	6
Tub, shower	1	2	3	6
Locomotion				
Walk/wheelchair	1	1	4	6
Stairs	1	1	1	6
Motor Subtotal Score	12	19	39	68

Table 3: The rehabilitation steps (rehabilitation approach).

Week	Goals	Treatment administered
Week 1	Strengthen weak upper limb and lower limb muscles; strengthen trunk muscles; trunk control retraining	Passive movement to all joints of bilateral ULs and lower limbs (25 reps); suspension therapy to bilateral hamstrings; assisted curl-ups (x 10 reps x 2 sets); grip strengthening exercises using soft ball; STM to the paraspinal muscles; home exercise programmes
Week 2	Strengthen weak upper limb and lower limb muscles; strengthen trunk muscles; trunk control retraining	Passive movement to all joints of bilateral ULs and Lower Limbs (25 reps); free active exercises to all muscle groups of bilateral ULs in gravity free plane (×10 reps ×2 sets); free active exercises to LL muscle groups in gravity free plane (×10 reps ×2 sets)
		Suspension therapy to bilateral hamstrings; assisted curl-ups (×10 reps ×2 sets); trunk rolling exercises; STM to the paraspinal muscles; home exercise programmes
Week 3, 4, 5	Strengthen weak lower limb muscles; maintain strength of upper limb muscles; strengthen trunk muscles; trunk control retraining	Resisted active exercises to bilateral upper and lower limb muscle groups with 1kg sand bag (×10 reps ×2 sets); free active exercises (gravity free plane) to bilateral hamstrings (×10 reps ×2 sets); bridging exercises (×10 secs ×10 reps ×2 sets); rhythmic stabilization in high sitting; standing reeducation with walking frame and PLS (×10 mins); home exercise programmes
Week 6 and 7	Strengthen weak lower limb muscles	Squatting exercises
	Retrain balance and walking	Resisted active exercises to bilateral hamstrings using 2kg sandbags (×10 reps ×2 sets); walking reeducation with Zimmer's frame; one leg stance exercise
Week 8, 9 and 10	Balance training; community reintegration	Tandem walking; use of wobble board; use of stepper (×20 reps); brisk walking on treadmill (x 5 mins)

All of these exercises, together with trunk rolling exercises and free active exercises to all muscle groups of bilateral ULs in a gravity-free plane, were performed in weeks 1 and 2. Also emphasized were home programme exercises. Through verbal cues, the therapist urged the patient to assist with movements. When we reevaluated the patient at the end of the second week, the GMP at the upper limbs was 3, the grip strength was fair and the patient could roll over without difficulty and sit up with little assistance.

Week 3-7 were focused on the medium- term goals, resisted active exercises, bridging excises and rhythmic stabilization were introduced. We were able to stand the patient at the fifth week with Zimmer's frame. His performance was great and his parents' excitement was obvious. At week six, we started squatting exercises, one leg stance and walking re-education with Zimmer's frame. FIM scores were reassessed at the fourth and seventh week (Table 2).

In the long-term goal (week 8-10), tandem walking, use of wobble board and stepper were added to the line of management. We also introduced brisk walking on treadmill at the tenth week which was well tolerated. We re-assessed the patient again at the 10th week, patient walked independently without any gait abnormality and was reported to be playing football with his friends. When we called the patient's father to check up on him, he expressed gratitude for the care received and learned that the patient had resumed his studies. The rehabilitation steps is presented in Table 3.

All lower extremity motions had improved to a 4/5 by the patient's last week, with the exception of plantar flexion, which was at a 3/5, while his strength continued to improve. By the last week, his flexibility in his lower extremities had also returned within normal limits. At this point, the final FIM score was recorded (Table 2). The patient was discharged after accomplishing all of the physical treatment goals. After that, he was given a longer appointment lasting 4 weeks and instructed to continue with the home programme exercise.

DISCUSSION

An 8-year-old boy with GBS was evaluated and rehabilitated in this case report. The patient and the physiotherapists worked together to develop the care and treatment plan. Although there were few clinical studies on the physiotherapy management of GBS, the evidence that was currently available points to the necessity for an activity-based treatment strategy that had a focus on the symptoms. The treatments in this case study were adapted to the patient's symptoms. Prior to addressing other symptoms, some symptoms had to get better. For example, weak muscles and trunk needed to be worked on to pave way for standing and walking re-education. As a result, the patient's treatment plan and procedures were structured. Muscle strength greatly increased for the ULs from GMP on 2/5 to 3/5 at the end of the second week and 4/5 in the final week. The GMP for LLs also increased at the last week, reaching a GMP of 4/5. Over the course of five weeks, the patient's symptoms significantly decreased. He made a substantial recovery from the weak and trunk muscles, and we were able to progress to standing at the end of the fifth week and walking at the end of the seventh week. High-evidence research methods such as randomized controlled trials and longitudinal studies, have not yet been used to investigate the influence of physiotherapy intervention on GBS. Our physiotherapy intervention was effective. The patient was a young boy who kept a good circle of friends with whom he engaged in extracurricular activities like football and other hobbies.

Interventions were carried out each week to get him prepared for standing before moving on to walking. According to Lubenova et al physical therapy sessions should be designed and focused on a specific functional activity while taking into account how relative symptoms are currently presenting.[16] The physical therapy procedures were successful in helping the patient reach his or her objective of safe ambulation by applying this approach. A methodical approach to therapies that included exercises that encouraged frequent postural changes and pushed the patient to solve challenges in order to promote independence saw positive results from this patient.[17]

Regarding treating people with GBS, optimal outcomes require completely individualized therapies. Due to the patient's constantly changing symptoms and condition, interventions must be assessed frequently. To ensure that the appropriate exercise type and intensity are prescribed, physical therapists must be aware of evaluating the patient's immediate and frequent responses to treatment. Exercises must be intense enough to stimulate a physiological and therapeutic response while yet being below the irritability threshold to avoid unwelcome exhaustion and nervous stress.[18] Although there is a dearth of large studies on this topic, this case study shows that physical therapy interventions help GBS patients restore function and lessen their disability.

CONCLUSION

GBS is one of the most common causes of AFP in children. Early referral for physiotherapy, clinical compliance, adherence to home programmes and family support were seen to greatly affect speed of recovery positively.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the Medical Director of Federal Medical Centre, Abeokuta for making the usage of electronic medical records (EMR) possible in the center. The EMR was helpful in our case study. We also value the assistance of the Director and Deputy

Directors of Physiotherapy at FMCA's Physiotherapy Department.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Hughes RA, Cornblath DR. Guillain-Barre syndrome. Lancet. 2005;366(9497):1653-66.
2. Hughes RA, Hadden RD, Gregson NA, Smith KJ. Pathogenesis of Guillain-Barré syndrome. J Neuroimmunol. 1999;100(1-2):74-97.
3. Levin MC, Krichavsky M, Berk J, Foley S, Rosenfeld M, Dalmau J, et al. Neuronal molecular mimicry in immune-mediated neurologic disease. Ann Neurol. 1998;44(1):87-98.
4. Ali M, Fernandez-Perez ER, Pendem S, Brown DR, Wijdicks EF, Gajic O. Mechanical ventilation in patients with Guillain-Barre syndrome. Respir Care. 2006;51(12):1403-7.
5. Newswanger DL, Warren CR. Guillain-Barre syndrome. Am Fam Physician. 2004;69(10):2405-10.
6. Wijdicks EF, Henderson RD, McClelland RL. Emergency intubation for respiratory failure in Guillain-Barre syndrome. Arch Neurol. 2003,60(7):947-8.
7. McCarthy N, Giesecke J. Incidence of Guillain-Barre syndrome following infection with *Campylobacter jejuni*. Am J Epidemiol. 2001;153(6):610-4.
8. Tam CC, Rodrigues LC, Petersen I, Islam A, Hayward A, O'Brien SJ. Incidence of Guillain-Barre syndrome among patients with Campylobacter infection: a general practice research database study. J Infect Dis. 2006;194(1):95-7.
9. Meche FG. The Guillain-Barre syndrome; pathogenesis and treatment. Rev Neurol Paris. 1996;152(5):355-8.
10. McGrogan A, Madle GC, Seaman HE, dVries CS. The epidemiology of Guillain-Barré syndrome worldwide. A systematic literature review. Neuroepidemiology. 2009;32(2):150-63.
11. Soysal A, Aysal F, Caliskan B, Dogan P, Mutluay B, Sakalli N, et al. Clinico-electrophysiological findings and prognosis of Guillain-Barré syndrome--10 years' experience. Acta Neurol Scand. 2011;123(3):181-6.
12. Cuadrado JI, de Pedro-Cuesta J, Ara JR, Cemillán CA, Díaz M, Duarte J, et al. Guillain- Barré syndrome in Spain, 1985-1997: epidemiological and public health views. Eur Neurol. 2001;46(2):83-91.
13. Bogliun G, Beghi E; Italian GBS Registry Study Group. Incidence and clinical features of acute inflammatory polyradiculoneuropathy in Lombardy, Italy, 1996. Acta Neurol Scand. 2004;110(2):100-6.
14. Hughes RA, Cornblath DR. Guillain-Barré syndrome. Lancet. 2005;366(9497):1653-66.
15. Hung KL, Wang HS, Liou WY, Mak SC, Chi CS, Shen EY, et al. Guillain-Barré syndrome in children: a cooperative study in Taiwan. Brain Dev. 1994;16(3):204-8.
16. Lubenova D. Kinesitherapy of neurogical and psychiatric diseases. Petrovi Sie. 2011.
17. Lubenova D, Titanova E. Principles of modern neurorehabilitation. Neurosci Cerebr Hemodynam. 2012;8(1):45-55.
18. Davidson I, Wilson CH, Walton T, Brissenden SH. Physiotherapy and Guillain-Barre syndrome: results of a national survey. Physiotherapy. 2009;95:157-63.

Cite this article as: Fafolahan AO, Olatunji TO, Davis AO, Sodipo OP, Adeoye KK, Musa BO, et al. Pediatric rehabilitation post Guillain-Barré syndrome: a case report at Federal Medical Centre, Abeokuta. Int J Contemp Pediatr 2022;9:955-9.