SHORT COMMUNICATION

Clinical and epidemiological characteristics of Guillain-Barré syndrome during the 2019 outbreak in a hospital in Chiclayo, Peru

Lisbeth Cueva-Ortega[1,a]; Diana C. Montenegro-Castro[1,a]; Heber Silva-Diaz[1,2,b]

1 Universidad de San Martín de Porres, School of Human Medicine. Chiclayo, Peru.
2 Hospital Regional Lambayeque, Dirección de Investigación (Research Directorate). Chiclayo, Peru.
[a] Medical student; [b] Biologist, PhD in Sciences.

ABSTRACT

The objective is to describe the clinical and epidemiological characteristics of Guillain-Barré syndrome (GBS) during the 2019 outbreak in patients treated at a hospital in Chiclayo, Lambayeque, Peru. This is a descriptive and retrospective study conducted on 36 cases. Data were collected through a documentary analysis of clinical-epidemiological surveillance research forms for GBS, provided by the Ministry of Health. The sample was characterized by a median age of 46.05 years, a predominance of male sex (69.40 %) and an origin from Lambayeque (66.70 %). Additionally, 19.40 % of patients had chronic diseases, and the most frequent conditions found in their medical history were respiratory infections (45.50 %) and gastrointestinal infections (36.40 %). The clinical presentation was characterized by weakness (97.20 %), ascending paralysis (72.20 %), paresis of the left facial nerve (8.30 %), hyporeflexia (91.70 %) and decreased muscle tone (47.20 %). We conclude that male sex, an age between 30 and 59 years and a history of gastrointestinal and respiratory infections were the predominant epidemiological characteristics of GBS in this outbreak; while weakness, ascending paralysis, pain, and hyporeflexia were among the most common clinical characteristics. Active surveillance and the strengthening of preventive and care capacities for this disease are recommended.

Keywords: Guillain-Barre Syndrome; Epidemiological Monitoring; Signs and Symptoms; Peru (Source: MeSH NLM).

INTRODUCTION

Guillain-Barré syndrome (GBS) is an acute inflammatory polyneuropathy, probably acquired and triggered by a previous infection. Fifty-eight percent of cases are associated with respiratory infections, and 22 % with gastrointestinal infections [1,2]. It is characterized by symmetrical weakness that progresses rapidly from distal to proximal muscles, loss or decrease in deep tendon reflexes, and mild or absent sensory signs. In addition, it can affect the respiratory and bulbar muscles [3].

Its pathophysiology remains unclear. Based on its neurophysiological characteristics, different variants have been proposed: acute motor axonal neuropathy (AMAN), acute motor and sensory axonal neuropathy (AMSAN), acute inflammatory demyelinating polyneuropathy (AIDP), and Miller Fisher syndrome (MFS). These disorders are mediated by immune mechanisms involving the presence of antibodies, which cause functional and structural damage to the axons and myelin of the peripheral nervous system [4].

From an epidemiological perspective, the global annual incidence is one to two cases per 100,000 inhabitants. All age groups can be affected, but it is more common in men. In children, 0.6 cases per 100,000 individuals are reported annually [1,2]. Moreover, incidence increases with age: by 20 % every 10 years [5]; it also rises during outbreaks of infectious diseases, such as during the Zika virus epidemics in French Polynesia in 2013 and in Latin America in 2015 [1].

The cause of GBS remains unknown; however, as mentioned above, it is mainly associated with a previous infection. In fact, in 70 % of cases, patients report having experienced a self-limiting illness prior to the onset of the syndrome. The bacterium *Campylobacter jejuni* has been identified in 25 % to 50 % of adult patients with the syndrome [6]. Other related microorganisms include cytomegalovirus (CMV), Zika virus (ZIKV), *Enterovirus* (EV), *Mycoplasma pneumoniae*, Epstein Barr virus, influenza A virus, *Haemophilus influenzae*, dengue virus, and, since 2020, SARS-CoV-2 [2,7].

In Peru, prior to 2019, the average monthly number of suspected cases was fewer than 20 [8]; between 2012 and 2017, 955 cases were reported [9], and in 2018, 341 cases [10]. However, in 2019, an unprecedented outbreak

Corresponding author:
Lisbeth Cueva-Ortega
liscueva.28012000@gmail.com

Received: August 2, 2023
Reviewed: August 28, 2023
Accepted: September 13, 2023

was reported. GBS occurred in nine of the 24 departments, particularly affecting northern regions (Piura, Cajamarca, La Libertad, and Lambayeque); approximately 900 cases were reported [8,11]. Between epidemiological weeks (EWs) 21 and 30 alone, 683 cases were reported, resulting in an annualized incidence of 30.9 cases per 100,000 inhabitants—25 times higher than expected and greater than in previous years. Therefore, the 2019 outbreak was classified as atypical and unusual due to its magnitude [12].

In Lambayeque region, during EW 23 of 2019, the highest number of cases was reported, with a total of 15, and it continued to rise until EW 35, with 34 cases. Furthermore, the number increased to 62 recorded cases, plus one death, by EW 45 [13]. On the other hand, on June 24, 2023, the Ministry of Health of Peru (Minsa) issued an epidemiological alert due to the increase in GBS cases, taking the 2019 outbreak as a reference and precedent, as it was the most significant in terms of case numbers [11]. This could indicate the frequent recurrence of unusual outbreaks of GBS in the future; therefore, it is necessary to know and understand the epidemiological and clinical context of previous outbreaks in order to adequately prevent, control, and manage future outbreaks. Accordingly, this study is aimed to describe the clinical and epidemiological characteristics of GBS during the 2019 outbreak at a hospital in Chiclayo, Peru.

THE STUDY

Of the 54 medical records reviewed, 10 were excluded for incomplete data, seven for a suspected diagnosis, and one for a ruled-out diagnosis, leaving a total of 36 medical records.

Table 1 describes the epidemiological characteristics of GBS. Most cases occurred in males, accounting for 69.40 % of the total. Ages ranged from 3 to 88 years, with a mean of 46.10 years. Concerning age groups, the most frequent was 30–59 years, with 17 patients. Data collection was carried out at the Hospital Regional Lambayeque (HRL), the referral hospital of the macro-region; 6.70 % of the cases were from the department of Lambayeque itself, followed by Cajamarca, with 19.40 % of cases.

A total of 19.40 % of the patients had a chronic disease (hypertension, diabetes, or epilepsy), and only 11.10 % received regular medication (irbesartan, losartan, and Valprax). The medical history of 33 cases was analyzed for events occurring four weeks prior to the onset of paralysis, as no data were found for three of them. A high frequency of respiratory and gastrointestinal infections was identified, at 45.50 % and 36.40 %, respectively. No patient had a history of travel in the 30 days prior to paralysis or of vaccination in the 40 days prior.

Table 1. Epidemiological characteristics of patients with GBS at the HRL, 2019 (*N* = 36)

Epidemiological characteristics	*n*	%
Sex		
Female	10	30.60
Male	26	69.40
Age (years)		
0–17	6	16.70
18–29	6	16.70
30–59	17	47.20
≥ 60	7	19.40
Department of origin		
Cajamarca	7	19.40
Lambayeque	24	66.70
Others	5	13.90
Chronic disease	7	19.40
Hypertension	3	8.30
Diabetes	2	5.60
Epilepsy	2	5.60
No medication	32	88.90
No risk of poisoning	36	100.00
Respiratory infection (*n* = 33)	15	45.50
Gastrointestinal infection (*n* = 33)	12	36.40

Epidemiological characteristics	*n*	%
Fever (*n* = 32)	3	9.40
No exanthema (*n* = 33)	33	100.00
No non-purulent conjunctivitis (*n* = 33)	33	100.00
Joint pain (*n* = 33)	1	3.00
Muscle pain (*n* = 33)	1	3.00
No headache (*n* = 33)	33	100.00
No travel history	36	100.00
No vaccination	36	100.00

Table 2 shows the clinical characteristics. Of the general signs and symptoms, the most common was weakness, in 97.20 % of cases. In addition, ascending paralysis was more common than descending paralysis, occurring in 72.20 % of cases. Less frequent manifestations included pain, ataxia, symmetrical involvement and hypertension, fever, autonomic dysfunction, urinary dysfunction, and hypotension. No cases of bowel dysfunction, sinus tachycardia, arrhythmias, or hyponatremia were reported.

The most common cranial nerve alteration was paresis, predominantly in the left facial nerve (8.30 %). With respect to muscle tone, the most common finding was a decrease.

Concerning the deep tendon reflexes of the biceps, triceps, patellar, and Achilles muscles bilaterally, hyporeflexia was observed in 91.70 % of cases, normoreflexia in 5.60 %, and no response in 2.80 %. Additionally, only one patient exhibited the triad of meningeal irritation signs.

Table 2. Clinical characteristics of patients with GBS at the HRL, 2019 (*N* = 36)

Clinical characteristics	*n*	%
General signs and symptoms		
Weakness	35	97.20
Ascending paralysis	26	72.20
Descending paralysis	10	27.80
Pain	8	22.20
Symmetry	5	13.90
Ataxia	2	5.60
Hypertension	2	5.60
Fever	1	2.80
Autonomic abnormality	1	2.80
Urinary dysfunction	1	2.80
Hypotension	1	2.80
Paresis by cranial nerves		
Facial nerve - left	3	8.30
Facial nerve - right	2	5.60
Cranial nerves IX-X - left	1	2.80
Cranial nerves IX-X - right	1	2.80
Trigeminal nerve - left	1	2.80
Trigeminal nerve - right	1	2.80
Decreased muscle tone		
Left upper limb	17	47.20
Right upper limb	17	47.20

Clinical characteristics	*n*	%
Left lower limb	17	47.20
Right lower limb	16	44.40
Deep tendon reflexes		
Hyporeflexia	33	91.70
Normoreflexia	2	5.60
No answer	1	2.80
Meningeal irritation		
Neck stiffness	1	2.80
Kernig sign	1	2.80
Brudzinski sign	1	2.80

Table 3 evaluates proximal and distal muscle strength in the upper and lower limbs on a scale of 0 to 5. The most frequent score was 3 (complete movement against gravity only).

Table 3. Evaluation of muscle strength in patients with GBS at the HRL, 2019 (*N* = 36)

Variables	0 *n* (%)	1 *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 *n* (%)
Left UL, proximal	1 (2.80)	10 (27.80)	6 (16.70)	15 (41.70)	2 (5.60)	2 (5.60)
Left UL, distal	0	7 (19.40)	4 (11.10)	8 (22.20)	2 (5.60)	15 (41.70)
Right UL, proximal	2 (5.60)	9 (25)	5 (13.90)	15 (41.70)	2 (5.60)	3 (8.30)
Right UL, distal	0	6 (16.70)	5 (13.90)	8 (22.20)	1 (2.80)	16 (44.40)
Left LL, proximal	2 (5.60)	10 (27.80)	4 (11.10)	13 (36.10)	5 (13.90)	2 (5.60)
Left LL, distal	1 (2.80)	7 (19.40)	6 (16.70)	4 (11.10)	1 (2.80)	17 (47.20)
Right LL, proximal	2 (5.60)	10 (27.80)	4 (11.10)	14 (38.90)	4 (11.10)	2 (5.60)
Right LL, distal	1 (2.80)	7 (19.40)	5 (13.90)	5 (13.90)	1 (2.80)	17 (47.20)

UL: upper limb; LL: lower limb.
Medical Research Council (MCR) Scale for Grading.

0: no contraction, paralyzed muscle.
1: palpable attempt at muscle contraction.
2: full movement if gravity is eliminated.
3: full movement against gravity only.
4: full movement against gravity and moderate resistance.
5: full movement against gravity and full resistance.

DISCUSSION

Thirty-six cases of GBS presented at the HRL in Chiclayo during the 2019 outbreak were studied. A predominance was observed in males and in the 30–59 age group. These observations are consistent with the results of a study conducted by Ballón-Manrique et al. at the same hospital between 2011 and 2015 [14]; the only difference was the number of cases reviewed (16 cases). This consistency demonstrates the relationship between sex and age with the disease, at least in the population of Lambayeque, Peru. On the other hand, Loayza et al. reported that, during the 2019 outbreak, most affected individuals were males aged 30 to 59 [15], which further confirmed that GBS is part of the minority of immunological disorders frequently observed in adult male patients; however, the cause remains unknown.

Previous studies indicate that most cases had a history of immunization or infection [2]. In the present study, no cases with a history of immunization were found, but there were cases of

infection, mainly respiratory and gastrointestinal. These results are consistent with those reported by Ballón-Manrique et al., who also described a history of digestive and respiratory infections [14]. This coincidence may suggest that these antecedents are highly likely to be direct or indirect causes of the cases studied. However, further studies and evidence are needed to confirm a causal relationship.

In this regard, multiple sources indicate that GBS typically occurs following an infectious process, usually caused by a virus such as dengue, influenza, or bacteria such as *Campylobacter jejuni*, *Haemophylus influenzae*, *Mycoplasma pneumoniae*, etc. [16]. It is important to consider this information because northern Peru suffered natural disasters due to heavy rains that led to flooding in 2017 and 2023, which in turn resulted in various infectious diseases associated with GBS [17].

Current evidence indicates that GBS involves antibodies that damage the axons and myelin of the peripheral nervous system due to cross-reactivity with viral or bacterial epitopes through molecular mimicry. Pathological consequences include impaired nerve conduction, causing motor deficits or paresthesia, pain in the upper and lower limbs and spine, muscle weakness, and ataxia. Motor defect is often symmetrical, progressive, with distal onset in the lower extremities and proximal progression [3,4,6]. In the present study, the clinical presentation was characterized by muscle weakness, ascending paralysis, and pain, which hindered walking and posed a public health problem, as patients required rehabilitation. This entails recovery, with potential complications, representing a high economic and social burden for the family and the State [1].

On the other hand, symmetry and ataxia were rare in this study. Ballón-Manrique et al. [14] also reported muscle weakness as the most common clinical motor feature, despite the interval between both studies (four years). It should be noted that symmetrical and bilateral facial paresis can be observed in a few patients. In addition, hypotonia and decreased deep tendons reflexes are characteristics that should be taken into account [18]. In the present study, paresis, according to cranial nerves, predominated in the left and right facial nerves. Likewise, decreased muscle tone was observed in all four limbs, along with hyporeflexia.

In patients with a severe course, motor, sensory, and visceral functions may be impaired. It manifests with fever, autonomic dysfunction, hypertension or hypotension, sinus tachycardia, arrhythmia, hyponatremia, and rectal dysfunction, among others [16]. In this study, only one patient exhibited fever, autonomic dysfunction, hypotension, and urinary dysfunction, while two patients developed hypertension.

The 2019 outbreak was classified as "atypical" because "patients developed the symptoms and signs of the syndrome within only one to two days, instead of the usual one to two weeks. In addition, a higher number of cases with descending paralysis were observed" [10]. The onset of symptoms could not be confirmed in this study, as the reviewed clinical-epidemiological forms did not include disease duration. With regard to paralysis, the above description was confirmed, as a significant number of patients presented with descending paralysis.

This study had some limitations. First, as a retrospective study, there was the possibility of systematic and random errors in the measurement of data recorded in the forms. Second, due to the small number of cases presented at a single hospital, it is not possible to generalize the results to other hospitals or regions of the country. However, given that the HRL—where the patients in this study were treated—is part of the Minsa and serves as a referral center for the Lambayeque region and several neighboring regions, a significant level of representativeness is required. In addition, more than half of the cases reported in the Lambayeque region during the 2019 outbreak were recorded at this hospital. Furthermore, this research identifies the predominant epidemiological and clinical variables in the study population, which will be useful for preventing and addressing new outbreaks, such as the one that occurred recently in 2023. Therefore, these results provide a foundation and reference for future complementary studies that will allow for a better understanding of the disease and a timely response to it.

In conclusion, patients treated at the HRL during the 2019 GBS outbreak exhibited epidemiological and clinical characteristics that were predictable and previously described for the disease and study population. It is recommended to consider these findings and to complement them with further studies that analyze the causality of the disease in each population where outbreaks occur, in order to prevent or strengthen the response capacity to new episodes, which, given the Peruvian climatic and epidemiological context, are likely to be inevitable.

Authors contributions: LCO, DCMC, and HSD participated in the conceptualization, research, methodology, presentation of results, and writing of the original draft.

Funding sources: This article was funded by the authors.

Conflicts of interest: The authors declare no conflicts of interest.

BIBLIOGRAPHIC REFERENCES

1. Leonhard SE, Mandarakas MR, De Assis Aquino F, Bateman K, Brito Ferreira ML, Cornblath DR, et al. Guía basada en la evidencia. Diagnóstico y manejo del síndrome de Guillain-Barré en diez pasos. Medicina (Buenos Aires) [Internet]. 2021;81(5):817-36.
2. Phillips Morales Ó. Actualización en el síndrome de Guillain-Barré. Rev méd sinerg(San José, En línea)[Internet]. 2019;4(11):e290.
3. Vega-Fernández JA, Suclupe-Campos DO, Coico-Vega MM, Aguilar-Gamboa FR. Viral etiology associated with Guillain-Barré syndrome: seeking an answer to the idiopathic. Rev Fac Med Humana [Internet]. 2022;22(3):584-96.
4. Carrera García L, Expósito Escudero JM, Natera de Benito D, Ortez C, Nascimento A. Neuropatías hereditarias y síndrome de Guillain-Barré. Protoc Diagn Ter Pediatr [Internet]. 2022;1:197-205.
5. Rigo D de FH, Ross C, Hofstatter LM, Ferreira MFAPL. Síndrome de Guillain Barré: perfil clínico epidemiológico e assistência de enfermagem: Guillain-Barré syndrome: epidemiological clinical profile and nursing care. Enferm Glob [Internet]. 2020;19(1):346–89.

6. Willison HJ, Jacobs BC, van Doorn PA. Guillain-Barré syndrome. Lancet [Internet]. 2016;388(10045):717–27.
7. Shahrizaila N, Lehmann HC, Kuwabara S. Guillain-Barré syndrome. Lancet [Internet]. 2021;397(10280):1214–28.
8. Organización Mundial de la Salud. Síndrome de Guillain-Barré – Perú [Internet]. Ginebra: OMS; 2023. Available from: https://www.who.int/ es/emergencies/disease-outbreak-news/item/2023-DON477
9. Rodríguez-Morales AJ, Failoc-Rojas VE, Díaz-Vélez C. Gastrointestinal, respiratory and/or arboviral infections? What is the cause of the Guillain-Barré syndrome epidemics in Perú? Current status – 2019. Travel Med Infect Dis [Internet]. 2019;30:114–6.
10. La Industria. Incertidumbre y desinformación por casos de Guillain-Barré [Internet]. Chiclayo: La Industria; 2019. Available from: http://www.laindustriadechiclayo.pe/noticia/1560466405-incertidumbre-y-desinformacion-por-casos-de-guillain-barre
11. Ministerio de Salud. Alerta epidemiológica: incremento de casos de Guillain Barré en algunas regiones del país. Perú: MINSA; 2023. Available from: https://www.dge.gob.pe/epipublic/uploads/alertas/alertas_202315_26_141558.pdf
12. Munayco CV, Gavilan RG, Ramirez G, Loayza M, Miraval ML, Whitehouse E, et al. Large outbreak of Guillain-Barré syndrome, Peru, 2019. Emerg Infect Dis [Internet]. 2020;26(11):2778–80.
13. CDC-MINSA. Situación de síndrome de Guillain-Barré Perú [Internet]. Perú: CDC-MINSA; 2019. Available from: https://www.dge.gob.pe/portal/docs/vigilancia/boletines/2019/35.pdf
14. Ballón-Manrique B, Campos-Ramos N. Características clínicas y paraclínicas del síndrome de Guillain-Barré en el Hospital Regional Lambayeque. Rev Neuropsiquiatr [Internet]. 2017;80(1):22-6.
15. Loayza Alarico MJ, De la Cruz Vargas JA, Alatrista Gutiérrez M del S. Síndrome de Guillain-Barré, brote epidémico en el Perú en junio de 2019. Salud Publica Mex [Internet]. 2019;61(5):556-7.
16. Vera O. Síndrome de Guillain-Barré. Cuad Hosp Clín [Internet]. 2019;60(2):59-64.
17. Soto-Cáceres V. Desastres naturales previsibles y prevenibles en el norte peruano: ¿cuándo estaremos todos juntos unidos trabajando para controlarlos? Rev Exp Med [Internet]. 2023; 9(1):1-2.
18. García Medina AJ, García Echevarría Y. Diplejía facial como forma de presentación del síndrome de Guillain-Barré. Rev Ciencias Médicas [Internet]. 2016;20(3):100–3.