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EDITORIAL

Unmasking Guillain-Barré Syndrome resurgences in Peru and possible preventive measures

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Guillain-Barré syndrome (GBS) is a post-infectious autoimmune inflammatory disease affecting the peripheral nerves and their spinal roots. It leads to numbness, tingling, progressive muscle weakness, complete loss of deep tendon reflexes, and paralysis. Globally, 1.1 GBS cases are reported per 100,000 people each year, affecting primarily males. [1] The mortality rate, or severe disability, in GBS patients is about 20%. According to a 2019 Global Burden of Disease study, 150,095 cases of GBS were reported globally (1990–2019), with an age-standardized point prevalence of 1.9 per 100,000 population, representing a 6.4% increase since 1990, raising concerns. [2]

Although the specific aetiology of GBS is unknown, in 50%–70% of cases, clinical manifestations are apparent within 1-2 weeks of a bacterial or viral infection, triggering an abnormal immunological reaction. [1] Animal experiments pointed out the crucial role of molecular mimicry, particularly the axonal variant in GBS. A lipooligosaccharide found in *Campylobacter jejuni*'s outer membrane in gastrointestinal infections has molecular symmetry with gangliosides, a component of the peripheral nervous system (PNS). [3] Ganglioside antibodies Anti-GD1a bind to paranodal myelin, nodes of Ranvier, and the neuromuscular junction [4], while autoantigenic gangliosides GM1 and GQ1B bind to peripheral nerves or the neuromuscular junction. [5] These distinctive PNS targets play a vital role in the heterogeneity of clinical manifestations and the pathogenesis of GBS.

Ascending weakness, which starts in the lower limbs, gradually spreads to the upper limbs and face as GBS progresses. Acute motor axonal neuropathy (AMAN), acute motor sensory axonal neuropathy (AMSAN), Acute inflammatory demyelinating polyradiculoneuropathy (AIDP), and Miller-Fisher syndrome (MFS) are a few of the recognised hallmarks associated with GBS patients. [6] Cerebrospinal fluid (CSF) analysis, nerve conduction velocity (NCV) studies, and magnetic resonance (MR) imaging findings of the spine following Brighton criteria confirm GBS. [7]

Current outbreak

According to the Pan American Health Organisation (PAHO), on average, Peru records around 20 incidences of GBS every month (excluding the 2019 outbreak). However, June witnessed an unexpected surge of 96 documented cases (suspected cases: 130; confirmed cases:

44) between June 10 and July 15, 2023, so the National Centre for Epidemiology, Prevention, and Disease Control (CDC) of Peru issued an alert on June 26, 2023. As of the preliminary records, 23% of the patients exhibited gastrointestinal complications, and 24.1% first had respiratory symptoms. Among the samples, 11 were positive for *C. jejuni*. Most of the GBS sufferers in this outbreak were male (58%), with an average age of 41. [8] In the 2019 outbreak, axonal damage was more prominent than demyelinating involvement, which pointed towards the presence of the *C. jejuni* ST2993 genotype as a triggering agent. [9]

GBS can occur due to the flu or other viral diseases such as cytomegalovirus, Epstein-Barr virus, or Zika virus. [10] A case-control study from Mexico showed laboratory evidence of Dengue virus (DENV) and Zika virus (ZIKV) infections associated with GBS. [11] The current outbreak rules out the probability of dengue outbreaks and Zika virus transmission. [12]

Strategic prevention plan from the outbreak perspective

GBS is not contagious, and outbreaks of GBS are sporadic. Historically, outbreaks of GBS have demonstrated contamination by *C. jejuni* linked to eating spinach, carrots, and products from farms or ranches. Additionally, the consumption of poultry, fruits, and vegetables that are frequently consumed raw after being washed has been identified as a common source of exposure. Furthermore, exposure to tap water through activities such as ice intake, tooth brushing, or rinsing also caused infection. [13]

The ingestion of insufficiently cooked chicken and the transmission of pathogens from raw poultry to other food items by contact with drippings are the primary contributing factors to campylobacteriosis in humans. Ensuring adherence to hygienic practises at every stage of the food supply chain, from the producer to the consumer, is crucial to preventing disease transmission. [14] (Figure 1)

A collaborative effort between WHO, the PAHO, and Peru to establish a constant laboratory-based monitoring system for Campylobacter sp. by collecting patient stool samples from different regions on time can be a potential strategy for future prevention measures. The enhanced exchange of information between water managers and specialists will improve the safety of the municipal water supply and prevent contamination due to faecal runoff containing *C. jejuni*. [15] The execution of a comprehensive action plan, encompassing financial measures to facilitate procuring essential resources in the healthcare sector, such as human immunoglobulin or plasmapheresis, is imperative for effectively treating GBS-affected individuals. Considering the 2019 GBS outbreak in Peru, it is necessary to launch public campaigns and take several steps to prevent enterovirus infection through the fecal-oral, respiratory, and conjunctival fluids. Adequate hygiene practises can help with this.

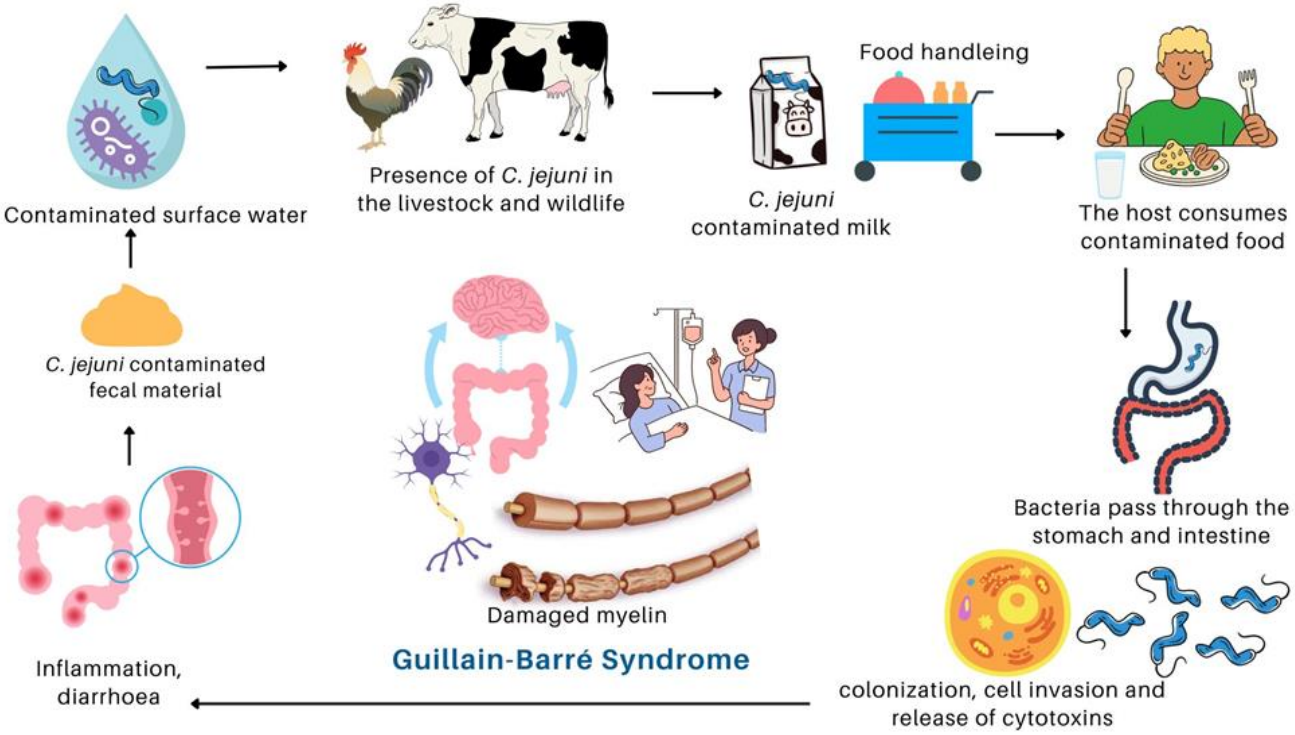

Figure 1: A Comprehensive Overview of the Transmission Cycle of Campylobacter Infections

A close eye on surveillance, preventive measures, and response strategies concerning potential instances may give a stronghold to the situation. The dissemination of risk information to healthcare professionals and the general community on adopting preventive measures is imperative. [16]

A binational, multidisciplinary approach is strongly recommended to prevent disease outbreaks. The extensive magnitude of this epidemic within a locality is characterised by the challenges of maintaining proper hygiene in the livestock and poultry industries, and the sanitation of water resources underscores the need for enhanced drinking water and wastewater treatment management. A set of measures encompassing training of workers, early disease recognition and control, informative talks to encourage timely healthcare seeking for persistent symptoms, discouraging self-medication, and proper hygiene practises may prevent future outbreaks.

Regards,

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Abbreviations
Acute inflammatory demyelinating polyradiculoneuropathy (AIDP), Acute motor axonal neuropathy (AMAN), Acute motor sensory axonal neuropathy (AMSAN), Centre for Epidemiology, Prevention, and Disease Control (CDC), Cerebrospinal fluid (CSF), Dengue virus (DENV), Guillain-Barré syndrome (GBS), Magnetic resonance (MR), Miller-Fisher syndrome (MFS), Nerve conduction velocity (NCV), Pan American Health Organisation (PAHO)
Zika virus (ZIKV)

Competing interests
None declared.

Publisher's Note

References
1. Esposito S, Longo MR. Guillain-Barré syndrome. Autoimmun Rev 2017;16:96-101. https://doi.org/10.1016/j.autrev.2016.09.022
2. Bragazzi NL, Kolahi A-A, Nejadghaderi SA, Lochner P, Brigo F, Naldi A, *et al*. Global, regional, and national burden of Guillain-Barré syndrome and its underlying causes from 1990 to 2019. J Neuroinflammation 2021;18. https://doi.org/10.1186/s12974-021-02319-4
3. Yuki N, Taki T, Inagaki F, Kasama T, Takahashi M, Saito K, Handa S, Miyatake T. A bacterium lipopolysaccharide that elicits Guillain-Barré syndrome has a GM1 ganglioside-like structure. J Exp Med. 1993 Nov 01;178(5):1771-5. https://doi.org/10.1084/jem.178.5.1771
4. Chiba A, Kusunoki S, Obata H, Machinami R, Kanazawa I. Serum anti-GQ1b IgG antibody is associated with ophthalmoplegia in Miller Fisher syndrome and Guillain-Barré syndrome: clinical and immunohistochemical studies. Neurology. 1993;43(10):1911-7. https://doi.org/10.1212/WNL.43.10.1911
5. Willison HJ, O'Hanlon G, Paterson G, O'Leary CP, Veitch J, Wilson G, Roberts M, Tang T, Vincent A. Mechanisms of action of anti-GM1 and anti-GQ1b ganglioside antibodies in Guillain-Barré syndrome. J Infect Dis. 1997;176 Suppl 2:S144-9. https://doi.org/10.1086/513799
6. Willison HJ. Ganglioside complexes as targets for antibodies in Miller Fisher syndrome. J Neurol Neurosurg Psychiatry. 2006;77:1002-3. https://doi.org/10.1136/jnnp.2006.094441
7. Sejvar JJ, Kohl KS, Gidudu J, Amato A, Bakshi N, Baxter R, *et al*. Guillain-Barré syndrome and Fisher syndrome: Case definitions and guidelines for collection, analysis, and presentation of immunization safety data. Vaccine 2011;29:599-612. https://doi.org/10.1016/j.vaccine.2010.06.003
8. Peru's spike in GBS cases, deaths prompts health emergency declaration. UmnEdu n.d.

https://www.cidrap.umn.edu/guillain-barre-syndrome/perus-spike-gbs-cases-deaths-prompts-health-emergency-declaration (accessed June 2, 2024).

9. Reyes-Vega MF, Soto-Cabezas MG, Soriano-Moreno AN, Valle-Campos A, Aquino-Peña F, Flores-Jaime N, *et al*. Clinical features of Guillain-Barré syndrome and factors associated with mortality during the 2019 outbreak in Peru. J Neurol 2023;270:369-76. https://doi.org/10.1007/s00415-022-11331-4
10. Guillain-Barré syndrome. WhoInt n.d. https://www.who.int/news-room/fact-sheets/detail/guillain-barr%C3%A9-syndrome (accessed June 2, 2024)
11. Grijalva I, Grajales-Muñiz C, González-Bonilla C, Borja-Aburto VH, Paredes-Cruz M, Guerrero-Cantera J, *et al*. Zika and dengue but not chikungunya are associated with Guillain-Barré syndrome in Mexico: A case-control study. PLoS Negl Trop Dis 2020;14:e0008032. https://doi.org/10.1371/journal.pntd.0008032
12. Guillain-Barré Syndrome - Peru. WhoInt n.d. https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON477 (accessed June 2, 2024).
13. Jackson BR, Zegarra JA, López-Gatell H, Sejvar J, Arzate F, Waterman S, *et al*. Binational outbreak of Guillain-Barré syndrome associated with Campylobacter jejuni infection, Mexico and USA, 2011. Epidemiol Infect 2014;142:1089-99. https://doi.org/10.1017/S0950268813001908
14. Altekruse SF, Stern NJ, Fields PI, Swerdlow DL. Campylobacter jejuni--an emerging foodborne pathogen. Emerg Infect Dis 1999;5:28-35. https://doi.org/10.3201/eid0501.990104
15. Igwaran A, Okoh AI. Human campylobacteriosis: A public health concern of global importance. Heliyon 2019;5:e02814. https://doi.org/10.1016/j.heliyon.2019.e02814
16. Briefing Note: Increase in cases Guillain-Barré Syndrome Peru. PahoOrg n.d. https://www.paho.org/en/documents/briefing-note-increase-cases-guillain-barre-syndrome-peru (accessed June 2, 2024).