



The Rising Tide of a Deadly Bacteria: How Warming Waters are Fueling the Spread of *Vibrio Vulnificus*

Priyanka Choudhary^{1*}, Prakasini Satapathy^{2*}, Amit Kumar Mital³, Sarvesh Rustagi⁴, Keerti Bhusan Pradhan⁵, Aroop Mohanty⁶, Bijaya K Padhi⁷ and Ranjit Sah^{8,9}

¹Department of Community Medicine, Shri Atal Bihari Vajpayee Government Medical College, Chhainsa, Faridabad, Haryana, India. ²Global Center for Evidence Synthesis, Chandigarh, India. ³Department of Paediatrics, DR Multispeciality Hospital, Faridabad, Navi Mumbai, Maharashtra, India. ⁴School of Applied and Life Sciences, Uttaranchal University, Dehradun, Uttarakhand, India. ⁵Department of Healthcare Management, Chitkara Business School, Chitkara University Punjab, Patiala, India. ⁶Department of Microbiology, All India Institute of Medical Sciences, Gorakhpur, Uttar Pradesh, India. ⁷Department of Community Medicine and School of Public Health, Postgraduate Institute of Medical Education and Research, Chandigarh, India. ⁸Tribhuvan University Teaching Hospital, Kathmandu, Nepal. ⁹Department of Clinical Microbiology, DY Patil Medical College, Hospital and Research Centre, DY Patil Vidyapeeth, Pune, Maharashtra, India.

Dear Editor,

Warming waters have been linked to the increase in infections with the rare flesh-eating bacterium *Vibrio vulnificus*, which is now moving along the east coast of the United States. This bacterium can cause life-threatening wound infections, with many people requiring intensive care or limb amputations, and about 1 in 5 people with this infection dying, sometimes within a day or 2 of becoming ill. This bacterium can lead to necrotizing fasciitis, a severe infection in which the flesh around an open wound dies.

Recently in July 2023, the North Carolina state reported the deaths of 3 residents after their open wounds came into contact with brackish water near the coast. The North Carolina Department of Health and Human Services (NCDHHS) is issuing a warning about this alarming *V. vulnificus* infection. Vibriosis is rare in this state and cases are mostly reported from June- September. NCDHHS also confirms that one individual also had consumed personally caught seafood that was not shared. Since 2019, 47 cases have been reported in North Carolina with a 17% case fatality rate.¹

The halophilic (salt-requiring) gram-negative bacteria namely *V. vulnificus*, exist naturally in seawater with increased infection occurrence and severity in warm summers (water temperature exceeds 150C) due to climatic change effects.^{2,3} Additionally, the increased salinity of seawater has predisposed to higher prevalence rates of *V. vulnificus* (salinity range between 21‰ and 33‰).² The reservoir of infection is sea animals and it is associated with eating sea foods, especially raw or uncooked oysters. It is a lethal zoonotic disease and its virulence is due to horizontal gene transfer in *V. vulnificus* and subsequently from aquaculture farms to human health.³ Globally the pooled prevalence of *V. vulnificus* in fishes was 5.29%.⁴ In 2018, vibriosis caused by *V. vulnificus* was 17.2 times more

severe than infections with other species of vibrio with higher prevalence in the age group ≥ 65 years.⁵ In this study, the infection occurred with male preponderance, activity like bathing in seawater was related to this infection.^{2,5} The infection is also transmitted through small skin lesions after exposure to seawater.⁶

V. vulnificus clinically presents with 3 distinct syndromes: wound infections, primary septicemia, and gastrointestinal tract-limited infections. A review of data from 1988 to 1996 reported 45% wound infections, 43% primary septicemia (blood culture isolation), and 5% gastrointestinal tract-limited infections.⁷ Atypical manifestations of *V. vulnificus* infection include meningitis, peritonitis, corneal ulcers, osteomyelitis, otitis, urinary tract infection, myositis, and rhabdomyolysis. Clinically, there is abrupt onset of fever and chills within 7 days followed by skin lesions preferably lower extremities or the trunk. Some cases have reported gastroenteritis, characterized by vomiting, diarrhea, and abdominal pain often preceded by fever, chills, and cutaneous manifestations. The complications of skin lesions are necrotic ulcers, necrotizing fasciitis, necrotizing vasculitis, or myonecrosis necrosis. A case study has reported death by sepsis in a severe form of acute septicemia within 48 hours after exposure.⁵ Moreover, patients with comorbidities like diabetes mellitus, end-stage renal disease, rheumatoid arthritis, liver dysfunction, and hemochromatosis are at high risk for serious *V. vulnificus* infection.^{6,8} The bacteria were isolated from blood samples (68.9%), wound-related samples (26.7%), and samples from ear infections (otitis media).⁵

Antibiotic and/or aggressive wound care is the main modality of treatment. *V. vulnificus* was susceptible to ampicillin and sulbactam, ampicillin, third-generation cephalosporin, ciprofloxacin, meropenem, aztreonam and trimethoprim-sulfamethoxazole.² In addition, supportive therapy, intensive care; surgical debridement of necrosed

*These authors contributed equally to this work.



wound, fasciotomy, or limb amputation. The disease can be prevented by measures like avoiding eating raw or uncooked shellfish, such as oysters. If wound is present then avoid contact with brackish seawater, raw seafood, or raw seafood juices.

Warming waters are causing a rise in infections with the rare flesh-eating bacterium *V. vulnificus*, which is moving along the USA's east coast. The impact of this pathogen is significant yet underappreciated, with the potential for the number of cases of *V. vulnificus* infections to double annually in the coming decades. Urgent action is needed to mitigate the impact of climate change and increase awareness of the potential risks posed by *V. vulnificus* infections. People can reduce their risk of infection by avoiding contact with warm saltwater or brackish water if they have open wounds, wearing protective clothing when handling raw shellfish, and thoroughly cooking shellfish before eating it.

Authors' Notes

Prakasini Satapathy is now affiliated to School of Pharmacy, Graphic Era Hill University, Dehradun 248001, India.

Amit Kumar Mital is now affiliated to Shri Atal Bihari Vajpayee Government Medical College, Chhainsa, Faridabad, Haryana, India.

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CORRESPONDING AUTHOR: Ranjit Sah, Tribhuvan University Teaching Hospital, Kathmandu, Maharajgunj, 44600, Nepal. Email: ranjitsah@iom.edu.np