COMMENTARY

Infect Dis Clin Microbiol 2023; 5(1): 63-5

Invasive Group A Beta-Hemolytic Streptococcal (iGAS) Infections: Is There a Public Health Threat?

Özlem Kurt-Azap

Department of Infectious Diseases and Clinical Microbiology, Başkent University School of Medicine, Ankara, Turkey

Streptococcus pyogenes, Group A beta-hemolytic streptococcus (GAS), is a Gram-positive coccus easily diagnosed in microbiology laboratories and generally causes mild diseases such as tonsillopharyngitis and pyodermas. However, severe, life-threatening illnesses called invasive GAS (iGAS) diseases may also, uncommonly, be seen. GAS has more than 150 different strains which have been identified based on M protein types. "Group A" is given according to Lancefield classification of beta-hemolytic streptococci based on carbohydrate structure (1).

Streptococcal tonsillopharyngitis, more commonly used synonym streptococcal sore throat, is the most common form of streptococcal infection affecting 600 million cases annually (2). A streptococcal sore throat may affect all age groups but is one of the most common illnesses in children between 5 and 15 years of age. Approximately 30% of tonsillopharyngitis cases among children and 10% of tonsillopharyngitis cases among adults are caused by *S. pyogenes*. Penicillin is the main drug for treatment (1, 3). As the disease is transmitted by droplets, crowded places such as schools or military facilities favor the pathogen's spread. Pharyngeal carriage is seen in 15% to 20% of children, but it is much lower among adults (1).

Scarlet fever, caused by erythrogenic toxins (streptococcal pyrogenic exotoxins), may be seen on the second day of streptococcal tonsillopharyngitis, appearing as a diffuse red blush. Although scarlet fever is generally associated with tonsillopharyngitis, it may also follow other streptococcal infections. The skin rash fades over one week course and is followed by extensive desquamation lasting for several weeks. Severe forms of scarlet fever, such as septic or toxic scarlet fever, were frequent in the pre-antibiotic era but are now rarely seen (1).

GAS may cause skin and soft tissue infections, namely, impetigo, erysipelas, and cellulitis. Approximately 111 million cases of pyoderma are reported annually (2). These infections are generally not severe and respond to antibacterial treatment.

Corresponding Author:
Özlem Kurt-Azap

E-mail:
ozlem.azap@gmail.com

Received: February 05, 2023
Accepted: February 09, 2023
Published: March 11, 2023

Suggested citation:
Kurt-Azap Ö. Invasive Group A beta-hemolytic streptococcal (iGAS) infections: Is there a public health threat? Infect Dis Clin Microbiol. 2023;1:63-5.

DOI: 10.36519/idcm.2023.220

Non-suppurative complications of GAS infections, i.e., acute rheumatic fever and post-streptococcal glomerulonephritis, have a high burden, particularly for children aged 5-15 years. The prevalence of rheumatic heart disease is 15.6 million; 282,000 new cases are diagnosed yearly, and 233,000 deaths are reported (2). The mortality rates and percentages for long-term sequela of post-streptococcal glomerulonephritis have not reported, but it was assumed to be that 1% of people with acute post-streptococcal glomerulonephritis die, either in the acute phase or in long-term because of renal failure (2).

Invasive GAS infections may be categorized into two main clinical forms; necrotizing fasciitis and streptococcal toxic shock syndrome (STSS).

Necrotizing fasciitis caused by iGAS is described as type II necrotizing fasciitis, also known as hemolytic streptococcal gangrene. Necrotizing fasciitis is the destructive infection of the skin and underlying structures, i.e., subcutaneous tissues, fascia, and muscle. Because of the destruction of fat and muscle tissues very rapidly, in the mass media, the causative agent is described as "flesh-eating" bacteria. Type II necrotizing fasciitis is characterized by the isolation of *S. pyogenes* with or without other bacterial species; *Staphylococcus aureus* is the most common species found in co-infections (1, 4). About 20% of necrotizing fasciitis cases result in death (1). It was reported that every year, between 600 and 700 cases are diagnosed in the United States, and about 25% to 30% of those cases result in death. It is rare among children (4).

STSS is a rapidly progressing infection that causes shock and injury to internal organs such as the liver, kidneys, and lungs. STSS is the most lethal form of iGAS, with a 60% mortality rate (1).

Group A streptococcal bacteremia was seen before the 1980s, predominantly at the extreme ages of life, but is rarely seen in the antibiotic era (1). Still, GAS bacteremia may be diagnosed among intravenous drug users in addition to the outbreaks in nursing homes (1). The source of GAS bacteremia in children may be upper respiratory tract infection, but it is more commonly associated with cutaneous foci like burns. GAS bacteremia may be transient and benign, but it is more often fulminant. Mortality is reported to range from 27% to 38% (1).

In 2022, there was some news about fatal streptococcal infections among children on mass media and social media. France, Ireland, Netherlands, Sweden, and the United Kingdom health authorities observed an increase in cases of GAS infection and scarlet fever, mostly affecting children under 10 years of age. The increase in GAS infections was particularly marked during the second half of the year (5, 6, 7).

World Health Organization (WHO) stated that the observed rates of increase reported to WHO/Europe and the European Centre for Disease Prevention and Control (ECDC) have followed a period of reduced incidence of GAS infections during the COVID-19 pandemic. It was also stated that the increase in cases of iGAS disease in children is also associated with the recently increased circulation of respiratory viruses, as co-infection of viruses with GAS may increase the risk of iGAS disease (8).

It is difficult to evaluate the global burden of GAS and iGAS infections because they are notifiable diseases in only a limited number of European countries and the USA (8, 9). Centers for Diseases Control and Prevention (CDC) tracks iGAS infections through Active Bacterial Core (ABCs) surveillance which is population-based, active, and laboratory-based surveillance (10). The current rise in cases of scarlet fever and iGAS from the United Kingdom is of concern, and it has been stated that the case fatality rate from iGAS in children appears to be in line with previous years; however, whether the risk of death is higher than expected will be investigated (11, 12).

CDC has also stated that the USA had very low numbers of iGAS infections in children during the COVID-19 pandemic, and based on preliminary 2022 data, iGAS infections in children returned to levels similar to those seen in pre-pandemic years (13). WHO has declared that investigations are still ongoing, but based on available data, the surge of cases is not related to a specific or new strain nor an increase in antibiotic resistance of GAS (8, 14).

WHO currently assesses the risk for the general population posed by iGAS infection as low and has declared advice about clinical practice, laboratory issues, and surveillance (8, 14). It has been emphasized that early recognition of iGAS disease and prompt initiation of specific and supportive therapy for patients will be both lifesaving and helpful in reducing the transmission of GAS (14). Health authorities should encourage clinicians to obtain specimens and encourage the laboratories for antimicrobial susceptibility testing and molecular testing. Good hand and respiratory hygiene are recommended, as well as good indoor ventilation. It has also been emphasized that the prevention of viral respiratory tract infections is important in reducing the transmission of GAS strains, so vaccination against influenza and COVID-19 should be encouraged (14).

Prompt clinical evaluation and treatment of the cases and meticulous surveillance measures will probably make the situation clear in the coming months.

Ethical Approval: N.A.

Informed Consent: N.A.

Peer-review: Externally peer-reviewed

Conflict of Interest: The author declares no conflict of interest.

Financial Disclosure: The author declared that this study has received no financial support.

REFERENCES

1 Bryant AE, Stevens DL. Streptococcus pyogenes. In: Mandell GL, Bennett JE, Dolin R, eds. Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases. 5th ed. Philadelphia: Churchill Livingstone, 2000: 2446-61.

2 Carapetis JR, Steer AC, Mulholland EK, Weber M. The global burden of group A streptococcal diseases. Lancet Infect Dis. 2005;5(11):685-94. [CrossRef]

3 Shulman ST, Bisno AL, Clegg HW, Gerber MA, Kaplan EL, Lee G, et al. Executive Summary: Clinical practice guideline for the diagnosis and management of group A streptococcal pharyngitis: 2012 update by the Infectious Diseases Society of America. Clin Infect Dis. 2012;55(10):1279-82. [CrossRef]

4 Group A streptococcal (GAS) disease: Type II necrotizing fasciitis [Internet]. Atlanta: Centers for Disease Control and Prevention (CDC). [cited February 3, 2023]. Available from: https://www.cdc.gov/groupastrep/diseases-hcp/necrotizing-fasciitis.html

5 Group A streptococcal infections: report on seasonal activity in England, 2022 to 2023 [Internet]. London: UK Health Security Agency (UKHSA). [accessed February 3, 2023]. Available from: https://www.gov.uk/government/publications/group-a-streptococcal-infections-activity-during-the-2022-to-2023-season/group-a-streptococcal-infections-report-on-seasonal-activity-in-england-2022-to-2023

6 Infection invasive à streptocoque du Groupe A (IISGA): point au 8 décembre 2022 et dispositif de surveillance [Internet]. Saint Maurice: Agence Nationale De Santé Publique. [cited February 3, 2023]. Available from: https://www.santepubliquefrance.fr/les-actualites/2022/infection-invasive-a-streptocoque-du-groupe-a-iisga-point-au-8-decembre-2022-et-dispositif-de-surveillance

7 Update on Group A streptococcus [Internet]. Dublin: Health Protection Surveillance Centre. [cited February 5, 2023]. Available from: https://www.hpsc.ie/news/title-22663-en.html

8 Increase in invasive Group A streptococcal infections among children in Europe, including fatalities [Internet]. Geneva: World Health Organization (WHO). [cited February 4, 2023]. Available from: https://www.who.int/europe/news/item/12-12-2022-increase-in-invasive-group-a-streptococcal-infections-among-children-in-europe--including-fatalities

9 Group A streptococcal (GAS) disease: Surveillance [Internet]. Atlanta: Centers for Disease Control and Prevention (CDC). [cited February 5, 2023]. Available from: https://www.cdc.gov/groupastrep/surveillance.html

10 Active Bacterial Core Surveillance (ABCs) [Internet]. Atlanta: Centers for Disease Control and Prevention (CDC). [cited February 4, 2023]. Available from: https://www.cdc.gov/abcs/index.html

11 Venkatesan P. Rise in group A streptococcal infections in England. Lancet Respir Med. 2023;11(2):e16. [CrossRef]

12 The Lancet Microbe. Strep A treatment, working for now. Lancet Microbe. 2023;4(1):e1. [CrossRef]

13 Increase in invasive group A strep infections, 2022–2023 [Internet]. Atlanta: Centers for Disease Control and Prevention (CDC). [cited February 3, 2023]. Available from: https://www.cdc.gov/groupastrep/igas-infections-investigation.html

14 Increased incidence of scarlet fever and invasive Group A Streptococcus infection - multi-country [Internet]. Geneva: World Health Organization (WHO). [cited February 3, 2023]. Available from: https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON429