

Streptococcus pyogenese: A Re-Emerging Bacterial Pathogen of Major Public Health Concern

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Currently, there are 1407 species of microbes that include viruses, bacteria, fungi, protozoa, and helminthes. Out of these, 177 pathogens are considered as emerging or re-emerging. The re-emerging pathogen is one, which shows an increased incidence in an existing population due to interaction of multiple complex factors. There are many re-emerging pathogens, such as *Brucella melitensis*, *Burkholderia mallei*, *B. pseudomallei*, chikungunya virus, *Coxiella burnetii*, dengue virus, *Francisella tularensis*, Japanese encephalitis virus, *Orentia tsutsugamushi*, *Salmonella typhimurium*, *Streptococcus pyogenese*, *S. suis*, and *Yersinia pestis*, which carry significant morbidity and mortality, and are reported from developing as well as developed nations of the world. Among these, *Streptococcus pyogenese*, which belongs to Lancefield Group A *Streptococcus*, is a re-emerging bacterial pathogen, which affects humans as well as animals. Streptococci, which occur in chains, were first time observed in erysipelas and wound infections by Billroth in 1974. However, the name *Streptococcus pyogenese* was proposed in 1884 by Rosenbach who isolated the organism from suppurative lesions. Infection is worldwide in distribution but most commonly reported in temperate zones, such as France, Germany, Norway, Spain, Sweden, and UK. In temperate regions, about 20 % of school children may act as carrier of Group A *Streptococcus* during the season of winter and early spring. Globally, there are about 663,000 new cases and 163,000 deaths due to invasive *S. pyogenes* disease annually. In addition, 111 million cases of *S. pyogenese* pyoderma and 616 million cases of pharyngitis are reported worldwide each year. Recently, scarlet fever, the major clinical entity of *S. pyogenese* infection, has re-emerged in epidemic form causing significant morbidity and mortality. The outbreaks of scarlet fever are recorded from many countries, such as Canada, China, France, Hong Kong, Macau, Spain, Thailand, Vietnam, UK, and USA. These outbreaks were observed in mainly in day care centers, families, military camps, prisons, and schools.

Presently, there are 74 species under the genus *Streptococcus* of which *S. pyogenese* is one of the most virulent species that can result life threatening infections in humans. The bacterium is Gram positive, aerobic, non-motile, non-spore forming, spherical shaped and catalase negative. It grows well at 37°C, and easily gets inactivated by antiseptics. The organism can survive on the inanimate objects for about one month. *Streptococcus pyogenese* occurs as a resident of pharynx of man.

Humans can acquire the infection from direct contact with diseased person or carrier. Indirect contact with contaminated objects may also produce infection. Ingestion of raw/ unpasteurized milk or other foods can result in outbreak of *S. pyogenese* infection. Foodborne cases of *S. pyogenes* have short incubation period with high attack rate (50 to 90%). Nosocomial infections are also recorded. Person to person transmission of *S. pyogenese* infection involves respiratory droplets and direct contact. The sick person during the act of milking can transfer the bacterium to dairy cows causing mastitis.

The clinical manifestations of *S. pyogenese* range from asymptomatic carriage and fatal infection. The patients show scarlet fever, septic sore throat, puerperal fever, rheumatic fever, pneumonia, tonsillitis, pharyngitis, pyoderma, cellulitis, impetigo, ulcer, erysipelas, phlebitis, lymphangitis, lymphadenitis, otitis, omphalitis, peritonitis, glomerulonephritis, endocarditis, meningitis, and septicemia. The pathogen may cause abscesses in various internal organs like lung, kidney, liver, and brain. Impetigo and erysipelas are commonly observed in young children, and older patients, respectively. Acute pharyngitis is frequently reported in paediatric cases.

Diagnosis can be confirmed by isolation of *S. pyogenese* from biologic specimens, such as throat swab, blood, bronchioalveolar lavage (BAL), cerebrospinal fluid (CSF), peritoneal fluid, pleural fluid, synovial fluid, urine, pus, biopsied or autopsied tissue on azide blood agar, bile esculin agar, brain heart infusion agar, and streptococcal medium. Most of the isolates of *S. pyogenese* produce beta haemolysis on sheep blood agar. Streptozyme test is a passive slide agglutination method that can be conveniently employed for screening *S. pyogenese* infections. Immunological tests are also used to demonstrate rise in antibody titer in serum of patient. Recently, molecular tools are employed for rapid identification of isolates of *S. pyogenese*.

A number of antibacterial antibiotics, such as amoxicillin, ampicillin, azithromycin, cefotaxime, clarithromycin, clindomycin, cloxacillin, dirithromycin, erythromycin, levofloxacin, and penicillin are recommended for the management of *S. pyogenese*. It is important to state that penicillin is still considered the drug of choice. However, the patients who are allergic to penicillin should be treated with other antibiotics like erythromycin. It is suggested that frequent gargles and swabbing with boroglycerine may give some relief in sore throat.

Currently, no commercially produced vaccine is available to immunize the susceptible population. Therefore, prevention and control depends on early diagnosis and prompt treatment, strict asepsis during obstetrical procedure, disinfection of exudates, secretions, and body fluids, proper pasteurization of milk before consumption, thorough veterinary inspection of dairy cows, avoiding ingestion of milk from mastitis animals, and health education to the public about the mode of transmission, severity of infection, personal hygiene and milk safety. In addition, the persons with skin lesions and respiratory illness are advised not to work in the food establishments. It is emphasized that prompt investigation of outbreak of *S. pyogenes* should be conducted. Further research on molecular epidemiology and vaccinology should be conducted.

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