Epidemiological markers of group A streptococcal infections in France

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Background & objectives: A limited number of biotypes, T-types, and emm-types have been found to be associated with invasive isolates of group A streptococci, confirming the involvement of the M protein in virulence and its importance as an epidemiological marker. In this study, the epidemiological markers in the clinical isolates of group A streptococci were compared in invasive and non invasive isolates.

Methods: From 1998 to 2001, 141 invasive and 353 non invasive isolates in France were studied and their biotype, T-type, and emm-type were determined.

Results: The invasive isolates were mostly obtained from blood whereas the non invasive isolates were isolated from throat. Most of the isolates were of biotype 1. The invasive isolates were mostly of the T-type 1 associated with emm-type 1. The T-type 4 associated with emm-type 4 and the T-type 28 associated with emm-type 28 were also frequent. Invasive isolates responsible for puerperal sepsis and non invasive isolates were mostly of the T-type 28 associated with emm-type 28.

Interpretation & conclusion: This study confirms the high prevalence of isolates of biotype 1, T-type 1, and emm-type 1 among invasive isolates of group A streptococci. The emm-type 28 associated with T-type 28 was frequently observed in non-invasive isolates. A prospective study is being conducted to update the prevalence of the different emm-types in France, which will be of importance for the development of future vaccines.

Key words Bacteraemia - emm-typing - pharyngitis - puerperal sepsis - Streptococcus pyogenes

Streptococcus pyogenes is responsible for suppurative infections either local, such as pharyngitis and pyoderma, or invasive (fasciitis, bacteraemia, and puerperal sepsis), associated or not with a streptococcal toxic shock syndrome1. A limited number of biotypes, T-types, and emm-types have been found to be associated with invasive isolates of S. pyogenes2, which confirms the involvement of the M protein in virulence and its importance as an epidemiological marker. Information regarding the geographic distribution of emm-types would be helpful in the development of vaccines directed against the prevalent strains. The present study was undertaken to compare these epidemiological markers in invasive and non invasive clinical isolates in France.

Material & Methods

During 1998-2001, a total of 494 (141 invasive and 353 non invasive) strains of S. pyogenes isolated in France were studied. The invasive strains were responsible for severe infections such as streptococcal toxic shock syndrome, necrotizing fasciitis, postpartum
endometritis, and bacteraemia. These were referred to the French Reference Center for Streptococci. The non invasive strains were isolated from throat (n=247) during a prospective survey of pharyngitis in Bourgogne, a large region of France, or from various clinical specimens (n=106) collected from all over the country. The biotypes were determined using rapid ID 32 STREP strips (bioMérieux, Marcy l’Etoile, France) according to the possible presence of β-glucuronidase and to the ability to hydrolyze four carbohydrates (Table)3. The serotypes T were determined by means of slide agglutination of trypsin-digested suspensions of washed bacterial cells in the presence of type-specific antisera (Institute of Sera and Vaccines, Prague, Czech Republic). The emm-types were determined by sequencing the variable 5’ end of the emm gene after amplification by PCR with the MF (5’-ATA AGG AGCATA AAAATG GCT-3’) and MR (5’-AGC TTA GTT TTC TTTGCG-3’) primers4.

Results & Discussion

The 141 invasive isolates were obtained from blood (n=103), skin (n=13), lung (n=12), synovial fluid (n=7), cerebrospinal fluid (n=3), and peritoneal fluid (n=3). The 353 non invasive isolates were from throat (n=281), skin (n=61), and other sources (n=11). The most common biotypes were biotype 1 (61% of invasive isolates, 43% of non invasive isolates), biotype 3 (16% of invasive isolates, 27% of non invasive isolates), and biotype 2 (8% of invasive isolates, 17% of non invasive isolates). Common T-patterns of invasive isolates were T1 (36%), T3/T13/B3264 (15%), T11/T12 (11%), T28 (10%), T4 (7%), and T8/T25/Imp19 (7%). Common T-patterns of non invasive isolates were T28 (27%), T11/T12 (21%), T1 (11%), T3/T13/B3264 (11%), T8/T25/Imp19 (9%), and T4 (7%). Seven per cent of isolates were non T-typeable. Most of invasive strains were of the emm-type 1 (Fig.), associated with biotype 1 and T-type 1. The emm-type 28, associated with T-type 28, was frequently observed among the non invasive isolates. This association was mostly found in non invasive isolates from throat during the prospective survey of pharyngitis, but also in seven invasive isolates responsible for puerperal sepsis.

Consistent with the other reports from developed countries2,5,6, this study confirms the high prevalence of biotype 1, T-type 1, and emm-type 1 among invasive isolates of group A streptococci. The T-type 4 associated with emm-type 4 and the T-type 28 associated with emm-type 28 were also frequent. The type 28, which is the third most common emm-type among invasive group A streptococci infections, was also the major type in the isolates from postpartum endometritis. This predominance in puerperal sepsis is in agreement with previous studies7. A prospective study is being conducted to update the prevalence of the different emm-types in France, which will be of importance for the development of future vaccines.

References


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