Group B Beta-Hemolytic Streptococci Causing Pharyngitis

JANE H. CHRETIEN,1,2* CRISTINA G. McGINNIS,1 JOANNE THOMPSON,3 EDWARD DELAHA,3 AND VINCENT F. GARAGUSI2

Student Health Service,1 Infectious Disease Division, Department of Medicine,2 and Bacteriology Laboratory,3 Georgetown University, Washington, D.C. 20057

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Group B beta-hemolytic streptococci were isolated from the throats of 49 of 1,110 patients who had pharyngitis. Compared with patients whose throat cultures were negative for beta-hemolytic streptococci, those harboring group B were more likely to have enlarged tonsils (P < 0.001), exudate (P < 0.02), and tender enlarged anterior cervical lymph nodes (P < 0.01). Group B should not necessarily be dismissed as a nonpathogen when identified in the pharynx of patients with exudative pharyngitis; laboratories which report beta-hemolytic streptococcal isolates from the pharynx only as group A or non-group A should be encouraged to perform definitive group identification of all beta-hemolytic isolates to further evaluate the role of other streptococcal groups as the causative agents for pharyngitis.

Although group A beta-hemolytic streptococci are responsible most frequently for streptococcal pharyngitis, pharyngitis may result from infection with other Lancefield streptococcal groups; i.e., both group C and group G organisms have been implicated as a cause of exudative pharyngitis (5, 13).

In the present study, the presence of group B streptococci in the throats of patients with clinical pharyngitis was determined, and its role as a causative agent for the illness was evaluated.

MATERIALS AND METHODS

Throat cultures were performed on 1,110 patients at a student health service over a 9-month period, as part of routine medical care for pharyngitis. Physical signs were recorded at the initial examination, before a throat culture was obtained. Throat culture swabs were inoculated onto blood agar plates containing 5% defibrinated sheep blood. After incubation at 35°C for 18 to 24 h, isolates showing beta-hemolysis were smeared and Gram stained. Those that were typical of streptococci in appearance were grouped by a battery of tests, including bacitracin sensitivity, sodium hippurate hydrolysis, bile tolerance, and hydrolysis of esculin.

Group A streptococci were identified by inhibition of growth around a 0.04-unit bacitracin disk (BBL Microbiological Systems; Taxo A); group B were identified by the hydrolysis of sodium hippurate; and group D streptococci were identified by the ability of the organism to hydrolyze esculin in the presence of 40% bile (10). Serological typing was used for strains that could not be grouped by the above matrix of tests as well as for confirmation of group B or group A identification (12) (Phadebact Streptococcus Tests; Pharmacia Diagnostics).

All patients whose cultures yielded growth of group B or group A beta-hemolytic streptococci were included in this study. From 944 patients whose cultures were negative for streptococci, a random sample of 100 was chosen to serve as controls for evaluation of physical signs in the absence of streptococci.

RESULTS

Of the 1,110 throat cultures obtained, there were 49 patients with group B beta-hemolytic streptococci (4.4% of all throat cultures) and 38 with group A (3.4%) in their throats at the time of clinical pharyngitis. An additional two patients had simultaneous carriage of both group B and group A and were excluded, as were patients whose cultures yielded beta-hemolytic streptococci of groups other than B or A. Seven patients had a concurrent diagnosis of infectious mononucleosis (four with group B and three with group A) and therefore were not included in analysis of symptoms. A total of 944 patients had negative cultures for hemolytic streptococci (Table 1).

The average age for patients with group B, 20.9 years, was the same as for patients with group A or with throat cultures negative for streptococci (20.8 and 21.4 years, respectively). A total of 53% of patients with group A, 43% of patients with group B, and 44% of those with negative cultures were male. These percentages were not statistically different from each other. Both group B and group A cases were distributed evenly throughout the time period studied, and there was no evidence of clustering according to school classes or place of residence. Patients with cultures negative for streptococci were selected randomly from the same months.
Other than an elevated temperature and a red pharynx, which occurred to a similar extent in all patients with a sore throat, the presence of either group B or group A streptococci was more likely to be associated with abnormal physical findings than was a negative throat culture (Table 2). Enlarged tonsils and enlarged, tender anterior cervical lymph nodes were present in a similar percentage of patients with group B or group A streptococci, which was significantly higher than in patients with negative cultures. Presence of exudate was noted most often in patients with group A, less often in patients with group B, and least frequently in patients with cultures negative for streptococci.

Five patients from whom a throat culture of group B was obtained had symptoms which required additional cultures and which also yielded group B streptococci. These cultures included three urine, one cervix, and one impetigo (Table 3). None of the patients with group A or with negative throat cultures had complaints requiring culture of other body sites.

Because of the frequent carriage of group B streptococci in the genital tract, patients with beta-hemolytic streptococcal infection of the pharynx were questioned about oral sexual contact. A total of 43% of the patients with group B (8 male, 13 female) and 61% of the patients with group A (11 male, 12 female) admitted to oral-genital sexual contact shortly before the onset of pharyngitis. Data were not available for patients with throat cultures negative for streptococci.

All patients with group A infection were treated with antibiotics, usually with 10 days of oral penicillin, or with erythromycin as an alternative for patients allergic to penicillin. Fourteen of the patients with group B were treated in a similar fashion; 71% of this group had prompt relief of symptoms within several days of starting antibiotic therapy, whereas 29% had lingering symptoms of pharyngitis. However, of the patients with group B who did not receive any treatment, only 39% had relief of symptoms within a similar short period of time (P < 0.02).

**DISCUSSION**

Group B beta-hemolytic streptococci have gained increasing significance as a human pathogen, causing sepsis, meningitis, pneumonia, and severe genitourinary tract infections, especially in debilitated or diabetic adults (1, 4, 7, 8, 14), and severe meningitis or sepsis in newborn infants after transmission from the mothers' genital tract (14). Upper respiratory tract infections due to group B streptococci have received little

### TABLE 2. Comparison of physical signs and organisms isolated from throat cultures in patients with pharyngitis

<table>
<thead>
<tr>
<th>Organism isolated</th>
<th>No. of patients</th>
<th>Enlarged tonsils</th>
<th>Exudate</th>
<th>Tender, enlarged nodes</th>
<th>Erythema</th>
<th>Temp. &gt;99°F (&gt;38°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group B streptococci</td>
<td>45</td>
<td>18(41)</td>
<td>14(32)</td>
<td>27(61)</td>
<td>36(80)</td>
<td>19(43)</td>
</tr>
<tr>
<td>Group A streptococci</td>
<td>35</td>
<td>20(57)</td>
<td>19(54)</td>
<td>23(66)</td>
<td>30(86)</td>
<td>12(34)</td>
</tr>
<tr>
<td>Normal flora 100</td>
<td>(NS)*</td>
<td>(P &lt; 0.05)*</td>
<td>(NS)*</td>
<td>(NS)*</td>
<td>(NS)*</td>
<td>(NS)*</td>
</tr>
<tr>
<td></td>
<td>(P &lt; 0.001)*</td>
<td>(P &lt; 0.02)*</td>
<td>(P &lt; 0.01)*</td>
<td>(NS)*</td>
<td>(NS)*</td>
<td>(NS)*</td>
</tr>
</tbody>
</table>

*Comparison of group B with group A by chi-square test of absolute numbers. NS, Not significant.

### TABLE 1. Isolates of beta-hemolytic streptococci in throat cultures of 1,110 patients with pharyngitis

<table>
<thead>
<tr>
<th>Group isolated</th>
<th>No. of isolates</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>49</td>
<td>4.4</td>
</tr>
<tr>
<td>A</td>
<td>38</td>
<td>3.4</td>
</tr>
<tr>
<td>B + A</td>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td>Other</td>
<td>77</td>
<td>6.9</td>
</tr>
<tr>
<td>No streptococci</td>
<td>944</td>
<td>86.1</td>
</tr>
</tbody>
</table>

*Group B streptococci + Staphylococcus aureus.
attention, although the pharynx is a site sometimes colonized by the organism.

Although group A is most commonly responsible for pharyngitis due to beta-hemolytic streptococci, other Lancefield groups have been known to cause disease. One large outbreak of pharyngitis on a college campus, with clinical symptoms typical of group A disease, was due to group G (13). Many patients had an exudative pharyngitis and enlarged tender anterior cervical lymph nodes, and half of those tested had increased antistreptolysin titer. The source of this outbreak was eventually traced to contaminated food. Another school outbreak resulted from group C infection (5). Of 29 patients with group C in cultures of the pharynx, 22 were symptomatic, including 7 who had an exudative pharyngitis. Group C, like groups A and G, may result in elevated antistreptolysin titer (6). Isolated, nonepidemic cases of pharyngitis have been associated with groups G and C and also with group B. In a large study of military recruits who had pharyngitis, group B was isolated from the throats of six men, and three of these men had an exudative pharyngitis (6). In two of the patients an elevated leukocyte count provided further evidence for association of group B streptococci with the clinical illness. However, most studies to determine prevalence of group B have not attempted to associate the organism with clinical disease.

In recent years, infection with group B streptococci has become one of the more common causes of bacteremia and meningitis in neonates, which often acquire infection from the mother's vagina. Because of these findings, surveys have been done to evaluate group B colonization in the vaginal flora. One study of several hundred women during the third trimester of pregnancy yielded a carrier rate of 22.5% in the cervix, and female nursery personnel had a similarly high cervical carrier rate of 30% (2). In another study, involving 499 college women, group B streptococci were isolated from the cervix of 18% and were correlated with sexual experience and presence of an intravaginal device (3).

In contrast to these recent efforts to determine prevalence of group B streptococci in the genital tract, pharyngeal surveys were conducted as early as 3 to 4 decades ago. In one of the earliest studies, of 475 pediatric patients hospitalized because of suspected streptococcal disease, 100 cases yielded hemolytic streptococci, none of which were group B (9). In an even larger study, involving 3,026 cases of respiratory disease in military recruits, group B was found in only 6 patients (0.2%), and the carrier rate in a large series of healthy recruits was only 0.1% (6). However, recent studies of healthy individuals have yielded higher carrier rates, from 4.9% (2) to 10.8% (14). Such studies have utilized a selective broth of Todd-Hewitt medium with gentamicin sulfate and nalidixic acid to prevent gram-negative organisms from overgrowing and may result in higher rates of isolation than would routine media (3, 11), but increasing colonization of the throat by group B streptococci is also possible.

The present study supports an association of group B streptococci and clinical pharyngitis. Statistically, enlarged tonsils and enlarged, tender anterior cervical lymph nodes were present to the same extent as in patients with group A, differing markedly from patients with negative cultures. Presence of exudate, although not as common as with group A, was still more than twice as frequent in patients with group B as in patients with negative cultures. Although viral cultures were not available to definitely determine the etiology of pharyngitis in each individual, those with group B had many more signs of severe pharyngitis than did patients with sore throat who had negative cultures. Antistreptolysin titer were not performed because group B streptococci do not produce streptolysin. In addition to clinical findings, antibiotic treatment of patients with group B infection also led to a more rapid disappearance of symptoms than in those untreated patients with a similar infection.

The cases seen in this study were sporadic rather than epidemic in nature, and the source of infection with group B streptococci remains uncertain. Genital acquisition of group B streptococci is considered venereal (3). The high rate of vaginal carriage of the organism together with changing sexual mores suggests a possible genital-oral spread. Almost half of our patients colonized with group B admitted to recent oral-genital sexual contact. However, an even larger number of those with group A admitted to similar contact shortly before onset of pharyngitis. Colonization of the organism in the throat may also be due to contamination from a distant bodily site. Although additional sites of colonization were not intentionally sought in these patients, five patients with group B pharyngitis had infections at other sites, including four genitourinary and one skin, from which the same organism was cultured.

Group B streptococci appear to have become more frequent inhabitants of the pharynx than in previous decades. In some cases they are associated with an exudative pharyngitis similar to that caused by group A streptococci, but they have never been associated with the nonsuppurative sequelae of streptococcal infections, such as rheumatic fever or glomerulonephritis. Since group B streptococci can be invasive, capable of
causing suppurative infections, they should not be dismissed as a nonpathogen when identified in the pharynx of patients with exudative pharyngitis. Laboratories which report beta-hemolytic streptococcal isolates from the pharynx only as group A or non-group A should be encouraged to perform definitive group identification of all beta-hemolytic isolates.

LITERATURE CITED