Jpn. J. Infect. Dis., 54, 2001

Laboratory and Epidemiology Communications

Epidemiological Survey of β-Hemolytic Streptococci Isolated from Acute Pharyngitis in a Private Pediatric Practice

Tadahiro Karasawa[1,2], Kentaro Takahashi[2] and Shinichi Nakamura[1]*

[1]*Department of Bacteriology, Graduate School of Medical Science, Kanazawa University, Takara-machi 13-1, Kanazawa 920-8640 and*
[2]*Takahashi Pediatric Clinic, Hikoso-machi 1-13-28, Kanazawa 920-0901*

Communicated by Hiroshi Yoshikura

(Accepted April 20, 2001)

Pharyngitis is one of the most common illnesses seen in the primary medical care of children. Most cases are of viral etiology, while others are mainly bacterial (1,2). The most prevalent bacterial pharyngitis is due to β-hemolytic streptococci (BHS), which are responsible for suppurative and nonsuppurative complications and are potentially highly transmissible. However, microbiologic data regarding streptococcal pharyngitis in Japanese pediatric practices have been limited (3). The present study aimed at elucidating the microbiologic status of streptococcal pharyngitis in pediatric outpatients.

This study was conducted at a private outpatient practice located in a metropolitan area of Kanazawa, Japan, between November 1996 and July 1998. Children with clinical diagnosis of acute pharyngitis were enrolled. Patients who had been treated with antibiotics in the previous 3 days or those who refused swab sampling were excluded. A throat specimen from each patient was collected using a cotton swab and immediately spread over a 15% sheep blood agar. The agar plates were incubated at 37°C under an aerobic condition. Growth of BHS in the initial culture plate was categorized as follows: 1+, 1-50 BHS-like colony(s) (i.e., the colony exhibited β-hemolysis, the appearance of which was consistent with that of BHS), <50% of total colonies; 2+, 51-200 BHS-like colonies, <50% of total colonies; 3+, >200 BHS-like colonies, <50% of total colonies; 4+, >200 BHS-like colonies, and 50-100% of total colonies. Lancefield's grouping and T serotyping were performed using a latex agglutination kit (STREPT LA SEIKEN; Denka Seiken Co., Ltd., Tokyo) and by group A T typing sera (Denka Seiken), respectively. At least five colonies on the initial culture were examined for Lancefield's grouping and T serotyping.

Patients were 2 months to 19 years of age. Of 360 specimens examined, 96 (26.7%) were BHS-positive. Among them, 77 samples were 4+, 11 samples 3+, 4 samples 2+, and 4 samples 1+. Age distribution of the BHS-positive patients was 1-14 years, consistent with the observations of previous reports (4,5). The isolates were homogeneous for Lancefield's group and T antigen. Although group A was predominant (90 isolates, 93.8%), groups B (two isolates, 2.1%), C (one isolate, 1.0%), and G (three isolates, 3.1%) were also detected (Table 1). Streptococcal pharyngitis was frequent during November to December 1997, when the most frequent isolate was T-untypable group A. There was a change in BHS serotypes during late summer to autumn in 1997. T serotypes of isolates were relatively diverse before the summer, while in the autumn and later, T 1, T 2, and T 6 serotypes came to be isolated consistently. It is customary in Japan that families

*Corresponding author: Tel: +81-76-265-2200, Fax: +81-76-234-4230, E-mail: nakamura@med.kanazawa-u.ac.jp

Table 1. Isolation of β-hemolytic streptococci

		1996		1997										1998									
		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Total
Lancefield's group	T serotype																						
A	1				1									2	1	1	1	1	3	1	1		12
	2												2	2		1		1	1	1		1	9
	2/28[1]				1	1	2		1				1	1						1			8
	4					1															2	1	4
	6								1				1		4	2	2	1	2	1			14
	12											1			1					1		1	4
	13						1																1
	14/49											1											1
	25												1										1
	28				2	4			3			1								1			11
	B3264						1												1				2
	UT[2]					1		1	1		2			6	8	1		1	1		1		23
B					1			1															2
C										1													1
G										1			1							1			3
Total No. of isolates[3]		0	0	0	5	7	4	2	6	2	2	3	6	11	14	5	3	4	8	7	4	3	96
No. of patients tested		3	10	4	18	18	30	30	17	12	14	14	21	25	26	23	19	17	15	18	11	15	360

[1]Agglutination was observed against both T-2 and T-28 antisera.
[2]UT, untypable.
[3]Each isolate was derived from a single β-hemolytic streptococcus-positive patient.

with preschool- or elementary school-aged children spend a few days in the parent's hometown away from their own house, often visiting the children's grandparents. Human migration during summer vacation may provide an opportunity for streptococci to colonize in new hosts. During the survey period, three patients had two episodes of group A streptococcal pharyngitis. Streptococci isolated from each patient in the two episodes were different in T serotypes.

Not only group A but also groups B, C, and G streptococci were isolated in the present study. Non-group A streptococci are relatively rare but may be important causative agents for pharyngitis (1,2,6). It should be noticed that non-group A streptococci cannot be detected using the currently used rapid antigen-detection tests.

Initial culture showing few colonies, i.e., 1+ and 2+ cultures, may reflect a situation in which a bona fide infection can be caused by a small quantity of streptococcus, or a situation where streptococci unrelated to the illness was present with pharyngitis-causing non-streptococcal agents. Distinction of the two alternatives is difficult (5).

Pichichero et al. showed that the incidence of group A BHS carriers in a private pediatric practice in Rochester, N.Y., was 2.5% among well children, 4.4% among children with upper respiratory infections (URI) including sore throat of presumptive viral etiology, and 6.9% among children with URI including sore throat from whom viruses were isolated (7). Though higher carrier rates (15-20% in normal children) of group A BHS have been generally accepted (4), the group A BHS carrier rate is not thought to be as high as has been previously supposed (5).

This work was supported in part by grants-in-aids for scientific research from the Ministry of Education, Culture, Sports, Science and Technology, Japan, and the Ministry of Health, Labour and Welfare, Japan.

REFERENCES

1. Bisno, A. L. (1996): Acute pharyngitis: etiology and diagnosis. Pediatrics, 97 (suppl.), 949-954.
2. Gwaltney, J. M., Jr. and Bisno, A. L. (2000): Pharyngitis. p. 656-662. *In* Mandell, G. L., Bennett, J. E. and Dolin, R. (eds.), Principles and Practice of Infectious Diseases. Churchill Livingstone, Philadelphia.
3. Murai, T., Inazumi, Y., Agata, T., Tokumaru, M. and Murata, T. (1988): A long term study of streptococcal infection experienced at an outpatient clinic-outline of patients, diagnoses and serotype of isolates-. J. Jpn. Assoc. Infect. Dis., 61, 471-481 (in Japanese with English summary).
4. Bisno, A. L. and Stevens, D. L. (2000): *Streptococcus pyogenes* (including Streptococcal toxic syndrome and necrotizing fascitis). p.2101-2117. *In* Mandell, G. L., Bennett, J. E. and Dolin, R. (eds.), Principles and Practice of Infectious Diseases. Churchill Livingstone, Philadelphia.
5. Carapetis, J. R., Currie, B. J. and Kaplan, E. L. (1999): Epidemiology and prevention of group A streptococcal infections: acute respiratory tract infections, skin infections, and their sequelae at the close of the twentieth century. Clin. Infect. Dis., 28, 205-210.
6. Chretien, J. H., McGinniss, C. G., Thompson, J., Delaha, E. and Garagusi, V. (1979): Group B beta-hemolytic streptococci causing pharyngitis. J. Clin. Microbiol., 10, 263-266.
7. Pichichero, M. E., Marsocci, S. M., Murphy, A. M. L., Hoeger, W., Green, J. L. and Sorrento, A. (1999): Incidence of streptococcal carriers in private pediatric practice. Arch. Pediatr. Adolesc. Med., 153, 624-628.