



## Original article

Group A *Streptococcus* pharyngitis outbreak among university students in a judo clubAkiko Aoki<sup>a,\*</sup>, Tatsuto Ashizawa<sup>a</sup>, Akira Ebata<sup>a</sup>, Yutaka Nasu<sup>b</sup>, Takeshi Fujii<sup>c</sup><sup>a</sup> Department of General Medicine, Tokyo Medical University Hachioji Medical Center, Japan<sup>b</sup> Central Clinical Laboratory, Tokyo Medical University Hachioji Medical Center, Japan<sup>c</sup> Department of Infectious Diseases, Tokyo Medical University Hachioji Medical Center, Japan

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## ABSTRACT

We report on an outbreak of Group A *Streptococcus* (GAS) pharyngitis among university students in a judo club. Eventually, 14 of total 23 club members developed acute pharyngitis clinically. In a span of 15 days in April 2013, 12 students visited our hospital complaining of sore throat and high fever. All were men with a median age of 19.5 years (interquartile range, 18–21). The rapid streptococcal antigen test was positive in 3 of 4 patients (75%) without previous antibiotic treatment, and in 2 of 8 patients (25%) with previous antibiotic treatment. The definitive diagnosis of GAS pharyngitis was made by either a positive RADT or positive throat culture of GAS when patients had more than 2 findings from the Centor scoring system in this study. 5 students received the definitive diagnosis. The throat culture results showed that 1 out of 9 asymptomatic students was GAS-positive. The outbreak might have occurred by person-to-person contact while living in a dormitory and during judo training, which is a highly close-contact sport. However, there was also the possibility of oral transmission by the shared use of water bottles, although the culture from 1 bottle was negative. Some students continued to participate in the judo club activities after the onset of sore throat or fever. Healthcare professionals, teachers, and coaches should be aware of the potential outbreaks of infectious diseases among university students engaged in athletic activities. Furthermore, it is important to educate athletes about infectious diseases.

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## 1. Introduction

Group A *Streptococcus* (*Streptococcus pyogenes*, GAS) is an aerobic gram-positive coccus commonly found in the oropharynx and on the skin. It causes pharyngitis and various cutaneous infections, invasive infections, and other complications such as acute rheumatic fever, acute glomerulonephritis, and toxic shock syndrome. In adults, GAS accounts for 5–15% of acute pharyngitis [1,2]. Nonsuppurative complications, such as acute rheumatic fever and acute glomerulonephritis, although uncommon, can follow GAS pharyngitis. It is important to make a diagnosis of GAS pharyngitis to reduce the incidence of nonsuppurative complications and to reduce the potential for transmission to close contacts.

We report on a GAS pharyngitis outbreak among university students who belong to a judo club in a suburban area in Japan.

## 2. Patients and methods

In a span of 15 days between April 16 and 30, 2013, 14 members of a university judo club developed acute pharyngitis clinically. There were 23 members in the club, and all of them were living in a dormitory with double occupancy. 12 of 14 affected students were observed at our hospital. Symptoms and signs of the Centor scoring system [3], including a fever of greater than 38 °C, tonsillar swelling or exudates, tender and enlarged anterior cervical lymph nodes, and absence of cough, were checked and recorded in the 12 patients (Table 1). White blood cell counts with differentials and serum levels of C-reactive protein (CRP) were obtained for all patients. Serum antistreptolysin O antibody (ASO) levels were measured with the latex agglutination method for 11 patients. We swabbed the throat and tested for GAS pharyngitis with the rapid antigen detection test (RADT) (Rapid Testa Strep A Kit, Sekisui Medical, Tokyo, Japan) on 12 patients. The sensitivity and specificity

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**Table 1**  
Characteristics of 12 patients who visited our hospital.

Patient #No.	Age	Height (cm)	Weight (kg)	Date of visit	Pre-treatment <sup>a</sup>	Max BT °C	Tonsillar swelling or exudates	Adenopathy	Absence of cough	Other symptoms	Centor Score	WBC/mm <sup>3</sup>	Neutro %	CRP mg/dL	ASO IU/L	Rapid antigen test	Culture of GAS	Antibiotic treatment
1	19	169	64	16-Apr	+	40	+	-	-	Skin eruption	2	6760	65	5.21	379	-	ND	LVFX
2	21	171	110	16-Apr	+	39.5	+	+	-	Nausea, vomiting	3	10,900	75.7	5.98	1300	+	ND	LVFX
3	21	174	70	16-Apr	-	39	+	+	-	Abdominal pain	3	7450	60.5	1.83	262	+	ND	LVFX → CFPN
4	18	164	125	26-Apr	-	39.4	+	+	+	Nausea	4	7010	60.3	5.33	ND	-	ND	AZM
5	18	178	74	26-Apr	+	39.6	+	+	+	Nausea	3	4810	48.3	7.78	165	-	ND	AZM
6	19	166	75	26-Apr	+	39.4	+	-	-	Nausea	2	11,100	78.1	1.05	395	+	ND	LVFX
7	19	165	62	26-Apr	+	39.2	+	+	+		3	6800	67.4	6.36	130	-	ND	AZM
8	20	176	80	26-Apr	+	39.3	± <sup>b</sup>	-	-		1	7760	65.8	2.29	231	-	ND	None
9	21	180	90	26-Apr	-	39.3	+	-	-	Headache	2	9610	73	0.28	393	+	ND	LVFX
10	22	176	90	30-Apr	-	38.9	± <sup>b</sup>	-	-	Skin eruption, diarrhea	1	5580	6508	7.07	232	+	+	AMPC
11	20	168	100	30-Apr	+	37.8	+	+	+	Nasal discharge	3	6140	57.2	6.86	233	-	-	AMPC
12	18	168	97	30-Apr	+	37.9	± <sup>b</sup>	-	-		0	8910	66.3	0.63	426	-	-	AMPC

+: indicates treatment with antibiotics, GAS: group A streptococcus, ND: not determined, LVFX: levofloxacin, CFPN: cefcapene pivoxil, AZM: azithromycin hydrate, AMPC: amoxicillin.

<sup>a</sup> Taking antibiotics before visiting our hospital.

<sup>b</sup> There was redness of the pharynx without tonsillar swelling.

of this kit for positive cultures are 92.6% and 92.8% by the product labeling. Initially, we did not perform throat cultures, but after suspecting a GAS pharyngitis outbreak, we performed both RADT and throat cultures. A swab sample was taken from one of the water bottles used by the students.

In this study, the definitive diagnosis of GAS pharyngitis was made by either a positive RADT or positive throat culture of GAS when patients had more than 2 findings from the Centor scoring system.

### 3. Results

#### 3.1. Outbreak (Fig. 1 and Table 1)

On April 16, 2013, 3 judo club members of a university (patients No. 1, 2, 3 in the Fig. 1 and Table 1) visited our hospital complaining of sore throat and high fever. As the RADT was positive in 2 of 3 students and since their symptoms were very similar, we diagnosed their disease as GAS pharyngitis and treated them with antibiotics. The judo training of all the members was suspended from April 17 to 21. However, 4 students (patients No. 4, 5, 7, 8) developed high fevers on April 22, and 6 students (patients No. 4–9) visited our hospital because of sore throat and high fever on April 26. Two of the 6 students showed positive RADT results. As a GAS outbreak was suspected, we made arrangements with the coach of the judo club to survey all club members.

On April 30, 3 symptomatic students (patients No. 10–12) and 10 asymptomatic students visited our hospital. One of them (patient B) reported pharyngitis symptoms and treatment history 9 days earlier. Throat swab cultures were taken from 13 students on April 30. GAS was isolated from 1 of 9 asymptomatic students. As he could have been a carrier, he was treated with amoxicillin for 10 days. The swab culture from the edge of the water bottle that was shared by the students was GAS-negative.

In short, among 23 judo members, 14 developed acute pharyngitis, and the definitive diagnosis of GAS pharyngitis was made in 5 students. One of 9 students who did not develop acute pharyngitis was shown to be GAS-positive by throat culture.

#### 3.2. Characteristics of 12 patients who visited our hospital (Table 1)

The median age of the 12 patients was 19.5 years (interquartile range, 18–21). All 12 patients were men and non-smokers. Regarding the signs and symptoms, high fever ( $\geq 38$  °C) was observed in 10 patients, tonsillar swelling or exudates in 9, and lymph node swelling and tenderness in 4. Absence of cough was observed in 4 patients. Scores of the Centor system were from 0 to 4. Eight of 12 patients had already taken oral antibiotics before visiting our hospital. Nine of 11 (90%) students showed an abnormal serum ASO titer ( $>166$  IU/mL). The RADT was positive in 3 of 4 patients (75%) without previous antibiotic treatment, and in 2 of 8 (25%) with previous antibiotic treatment. The minimum inhibitory concentrations (MICs) of antibiotics against the isolated *S. pyogenes* from patient No. 10 and the 1 asymptomatic student were as follows: Penicilline G (PCG) ( $\leq 0.03$  µg/mL), Ampicillin (ABPC) ( $\leq 0.06$  µg/mL), Cefotaxime (CTX) ( $\leq 0.12$  µg/mL), Ceftriaxone (CTRX) ( $\leq 0.12$  µg/mL), Cefcapene (CFPM) ( $\leq 0.5$  µg/mL), Erythromycin (EM) ( $>2$  µg/mL), Clindamycin (CLDM) ( $>1$  µg/mL), Levofloxacin (LVFX) (1 µg/mL), Vancomycin (VCM) (0.5 µg/mL).

### 4. Discussion

We report on an outbreak of acute pharyngitis among university students in a judo club. The RADT was positive in only 5 of 12 patients, but the ASO titers were elevated in 9 of 11 patients. The

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