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Short Communication

Efficacy of Throat Gargling for Detection of Group A Beta-Hemolytic Streptococcus

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SUMMARY: The purpose of our study was to investigate the suitability of throat gargling with sterile saline as an alternative method to throat swabs for detection of group A beta-hemolytic streptococcus (GAS). Throat specimens were obtained from 601 cases belonging to different age groups. Sterile Dacron swabs and gargle residue were first streaked on the side of a 5% sheep blood agar plate to which a 0.04 U bacitracin disk had been applied, and then 1.25 mg trimethoprim and 23.75 mg sulphamethoxazole were added to the plate. After incubation, beta-hemolytic colonies were classified serologically by latex agglutination. GAS was detected in both throat swabs and throat gargle specimens in 49 cases, but GAS was also detected in 12 throat swabs from patients with culture-negative gargles and in 8 gargle specimens from subjects in whom throat swabs were culture negative. The strength of agreement was evaluated by calculating the kappa coefficient (K = 0.82, P = 0.000). The sensitivity, specificity, positive predictive value, and negative predictive value of throat gargle specimens were 80.3, 98.5, 85.9, and 97.8%, respectively. Although the conventional throat swab culture remains the gold standard, the throat gargle method is a quick, safe, and easy method for detection of GAS that serves as an effective alternative to throat swab culture.

Sore throat is one of the most common of the physical complaints that result in a clinical visit for diagnosis and treatment. In more than 80% of cases, the cause of the sore throat is non-bacterial (1). Group A beta-hemolytic streptococcus (GAS) is the most frequent cause of bacterial pharyngotonsillitis (2). Therefore, it is important to determine whether beta-hemolytic streptococci identified in throat cultures belong to group A. The throat culture remains the diagnostic test of choice for the detection of group A streptococcus infection (3,4), and is traditionally obtained using a swab. To maximize accuracy, the tonsil region and posterior pharyngeal wall should be swabbed (5). The throat swab technique is subject to operator variation, and experienced operators are required to obtain good-quality throat swabs for the detection of GAS. We thought that it would be more efficient for individuals to provide their own samples without the requirement for an experienced throat swab taker. We could not find any study that focused on the suitability of throat gargle specimens for detection of GAS. Therefore, in this study we investigated the suitability of obtaining throat gargle specimens with sterile saline as an alternative to throat swabs for detection of GAS.

Throat swabs and gargle specimens were obtained from 601 cases (342 female, 259 male) belonging to different age groups. All subjects were admitted to the microbiology laboratory of Izzet Baysal University Hospital between March 2003 and March 2004. Subjects who had received antibiotics shortly before the study and children aged <12 years were excluded from the study. Sterile Dacron swabs were used for throat swabs. Throat swab specimens were obtained from the surface of both tonsils (or tonsillar fossae) and the posterior pharyngeal wall by the same physician. Then, the subjects gargled with 5 ml of 0.9% sterile saline for 10 sec. The gargle fluids were centrifuged at 5,000 g × for 5 min and supernatant fluid was discarded, leaving approximately 200 μl of residue that was mixed and used for inoculation. Sterile dacron swabs and gargle residue were first streaked on the side of a 5 % sheep blood agar plate to which a 0.04 U bacitrasin (B) disk had been applied, and then 1.25 mg trimethoprim and 23.75 mg sulphamethoxazole (SXT) were added to the plate. Then, the single colony streaking technique was applied using a wire loop. Slashing the agar facilitated detection of beta-hemolytic colonies, and then the plate was incubated for 24 h at 37°C. Examine plates that yield negative results after 24 h incubation it was extended at 48 h. Colonies with beta-hemolytic streptococci were classified according to their susceptibility to B (any zone) and resistance to SXT (no zone) as GAS. Additionally, beta-hemolytic colonies were classified serologically by latex agglutination (Stretococcal Grouping Kit; Oxoid, Hampshire, UK). The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated by comparing the culture results obtained by two different methods. The strength of agreement between standard method and modified method was evaluated by calculating the kappa (K) coefficient. The K values were classified as follows: <0.20, poor; 0.20 to 0.40, fair; 0.41 to 0.60, moderate; 0.61 to 0.80, good; and 0.81 to 1.00, very good agreement. Statistical analyses were performed using SPSS 9.0 for Windows (SPSS Inc., Chicago, Ill., USA).

GAS was detected in both throat swabs and throat gargle specimens from 49 subjects, but GAS was also detected in 12 throat swabs from patients with culture-negative gargle specimens and in eight gargle specimens from subjects in

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Table 1. Agreement of gargle and swab culture results

Gargle culture	Swab culture		Total (%)
	Positive (%)	Negative (%)	
Positive	49 (8)	8 (1)	57 (10)
Negative	12 (1)	532 (89)	544 (90)
Total	61 (10)	540 (90)	601 (100)

whom throat swabs were culture negative (Table 1). There was a good correlation between the results obtained from throat swabs and those obtained from gargle specimens. The sensitivity, specificity, PPV, and NPV of the gargle specimens were 80.3, 98.5, 85.9, and 97.8%, respectively. The K coefficient was found to be 0.82 ($P = 0.000$), which was interpreted as very good agreement. According to our findings, 61 (10%) subjects had swab positivity and 57 subjects (9.4%) had gargle positivity. The sensitivity of the gargle procedure was 80.3%, and it could not detect GAS in 12 cases. The reason for this might be that gargle fluid touched other places in the mouth besides the tonsils and nasopharynx, and picked up a large amount of flora from these locations. As a result, these extra amounts of flora bacteria may have inhibited GAS growth. It was surprising to find that the gargle procedure gave positive results in eight cases in which the swabs were negative for GAS. The reason for this may have been that the swab did not adequately contact the nasopharynx in these eight cases. On the other hand, the liquid gargle contacts a much broader surface area, including all portions of the posterior nasopharynx and tonsils. In most individuals, and particularly when the physician is in a hurry, the swab stimulates nausea and cough reflexes as it touches the nasopharynx. Moreover, in most of the swab procedures in the present study, the sick person coughed in the direction of the physician's face. Because GAS can spread through the transmission of fluid droplets from the nose or throat of an infected individual, the gargle procedure may help to prevent the spread of GAS among health care workers and others. In addition, the gargling method is less stressful for the patient because it is self-administered. Finally, it is worth noting that the throat cultures obtained by this method do not require the presence of an experienced health care worker. For all of the reasons, we consider the proposed method more suitable than the use of swab cultures, especially for GAS screening cultures.

There are two disadvantages to the throat gargle method. First, throat gargle samples necessitate the use of centrifugation, which means an additional investment of time and labor. Second, it is generally recommended that throat specimens for determining GAS should be obtained from the surface of both tonsils (or tonsillar fossae) and the posterior pharyngeal wall (5). However, in the throat gargle method, all spaces inside of the mouth could be contaminated with mouth flora. Due to these disadvantages of the throat gargle method, we still think that throat cultures should be taken by swab in diagnosing of GAS. However, we believe that the present method is a good alternative in cases in which the swab method will stimulate excessive cough and cause nausea (with its potential for viral/bacterial inoculation of the examiner) or increase stress due to swab insertion. This study substantiates the reliability of obtaining culture samples by self-administered throat gargle for diagnosing GAS, thereby avoiding the undesirable swab-induced gagging, anxiety, stress, and cough.The gargling method also has good potential for GAS screening in the general population.

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