

## Detection of *Streptococcus pyogenes* from Throat Swab in Acute Pharyngitis Patients

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### Abstract

**Background:** Pharyngitis is an inflammation of throat that may be caused by viral and bacteria. Although *Streptococcus pyogenes* is only responsible for 5–15% of cases of pharyngitis in adults. Antibiotics are highly prescribed for this infection, thus it could lead to antibiotic resistance. The main reason for antibiotic overprescription is the difficulty to obtain a rapid and correct etiological diagnosis. This study aimed to determine the frequency of *Streptococcus pyogenes* from throat swab in patient with acute pharyngitis in Padjadjaran Clinic.

**Methods:** This study was a descriptive study. Specimen was taken from the patients in Padjadjaran Clinic on September until October 2014. Thirty-five patients with acute pharyngitis that met the selection criteria were recruited for throat swab. Then, specimens obtained were performed an identification testing to determine whether there was a colonization of *Streptococcus pyogenes*.

**Results:** Thirty five patients were found with acute pharyngitis consist of 14 male and 21 female, with age ranged between 16–34 years old. From the identification testing result, *Streptococcus pyogenes* was not found from throat swabs of patient with acute pharyngitis in Padjadjaran Clinic.

**Conclusions:** This study found no colonization of *Streptococcus pyogenes* in throat swabs of acute pharyngitis patients in Padjadjaran Clinic, however *Streptococcus pyogenes* was not the causative fact of acute pharyngitis. [AMJ.2016;3(1):69–72]

**Keywords:** Acute Pharyngitis, *streptococcus pyogenes*, throat swab

### Introduction

Acute pharyngitis is an inflammation of the throat which is very common in primary health care facilities. An accurate diagnosis needs to be established so that the management given is appropriate. Virus infection is a major cause of acute pharyngitis, whereas several are caused by bacteria. However, in 15–30% of acute pharyngitis in children, and 5–15% in adults, *Streptococcus pyogenes* are found as the causative organism, which possibly cause a variety of serious complications, such as acute rheumatic fever and glomerulonephritis, if not dealt with accordingly.<sup>1</sup> Antibiotics are only needed in the management of acute pharyngitis caused by *Streptococcus pyogenes*. Although *Streptococcus pyogenes* were found in only a few cases in adults, but the prescribing of

antibiotics had reached 78–98%.<sup>2</sup> In a research by Shehadeh et al.<sup>3</sup> it shows that the use of antibiotics among adults, especially students, are often caused by sore throat complaints, regardless the prescribing of antibiotics given. Thus, in addition to microbial resistance to antibiotics, exposure to high antibiotic will also increase the duration of treatment, cost of treatment and the number of deaths; caused by the complication of infection that has not been dealt properly.<sup>4</sup>

Centor criteria, consists of fever with temperature above 38.5°C, enlarged lymph nodes, tonsils exudation, with the absence of coughing, can be used to predict the likelihood of streptococcal pharyngitis. However, laboratory tests still need to be performed to determine the causative diagnosis. Throat swab culture is the gold standard in diagnosing streptococcal pharyngitis with 90–95%

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sensitivity compared to Rapid Antigen Detection Test (RADT) which is only ranging about 70% sensitivity.

High level of antibiotics prescription can be caused by various factors, such as difficulty in determining the causative diagnosis promptly, clinician assumptions about the patient's desire to be prescribed antibiotics, as well as the tendency of clinicians to prescribe antibiotics even though the etiology is not clear.<sup>2</sup> The frequency of *Streptococcus pyogenes* found on acute pharyngitis might be considered by clinicians in prescribing antibiotics. Padjadjaran Clinic is a university clinic that provides a health care access for the students and the community in Jatinangor. However, there were no studies on the frequency of streptococcal pharyngitis in this clinic. This study aimed to determine the frequency of *Streptococcus pyogenes* from throat swabs of adult patients with acute pharyngitis in Padjadjaran Clinic.

## Methods

The study was a descriptive which conducted at the Laboratory of Microbiology, Faculty of Medicine, Universitas Padjadjaran in September to October 2014 after receiving approval from the Health Research Ethics Committee Faculty of Medicine, Universitas Padjadjaran. From the population who met the selection criteria, 35 people were selected as subjects by using consecutive sampling method. The selection criteria set out in this study were: acute pharyngitis patients with Centor criteria in Padjadjaran Clinic, aged over 15 years old, and were not on antibiotics treatment in the last 2 weeks. The subjects

were given an explanation of the purpose and the procedures to obtain the throat swabs and were asked to state their willingness by filling out and signing the informed consent. Throat swab specimen collection was conducted on the research subjects who were willing. The throat swabs obtained were taken to the laboratory to be planted on blood agar medium, observed with Gram staining, and confirmed by bacitracin test. Throat swab culture is the method used in this study, because it is the gold standard in the diagnosis of streptococcal pharyngitis which had the highest sensitivity (90–95%) compared to other methods (RADT).<sup>5</sup>

The minimum number of samples was determined using the minimum sample formula for descriptive categorical variables which resulted in 35 minimum samples.

## Results

From the 35 subjects, there were 14 male and 21 female with age ranging from 16 to 34 years old.

The laboratory tests showed that, from the culture on blood agar media, the percentage of beta-hemolytic colonies were 23%. Gram staining was done on those samples to identify the streptococcal colonies. From the gram staining test, 5% (2 out of 34) were positive streptococci, which both were confirmed by bacitracin test later. The bacitracin test showed negative results on both of the sample, which means the bacteria *Streptococcus pyogenes* were not found in this study.

Based on the isolation and identification of bacteria, the results showed no bacterial colonization of *Streptococcus pyogenes* in

**Table 1 Laboratory Test Results**

Identification Test	Total	Percentage (%)
Types of Hemolysis		
A	9	25.7
β	8	22.9
non-hemolytic (-)	18	51.4
GramStaining on β Hemolytic		
Positive, cocci, chain (+)	2	5.72
Positive, cocci, chain (-)	6	17.14
BacitracinTest on β Hemolytic and Gram-Positive Cocci		
Resistent (R)	2	5.72
Sensitive (S)	0	0

**Table 2 Amount and Percentage of Streptococcus pyogenes Colonization**

S. Pyogenes Colonization	Frequency	Percentage (%)
Positive (+)	0	0
Negative (-)	35	100

throat swabs of all subjects.

## Discussions

This study showed that, from 35 patients with acute pharyngitis, there was no colonization of *Streptococcus pyogenes* found in their throat swabs. This result is different when it is compared to similar studies conducted in other countries. In a study in Pakistan<sup>6</sup>, from 137 throat swabs of acute pharyngitis patients, 4.4% of *Streptococcus pyogenes* colonies were found. Likewise, a study in Taiwan<sup>7</sup>, 1% of *Streptococcus pyogenes* were found from 294 patients with pharyngitis. This condition can be caused by the number of subjects and different sampling sites, in which patients who visited the hospital tend to have more severe symptoms compared with patients who came to the clinic. In addition, more number of samples in the other two study could lead to a higher probability of finding *Streptococcus pyogenes*.

In this study, the majority of subjects were students, whereas the rest are secondary school students and employees. This could be caused by the ownership of Padjadjaran Clinic, which is a clinic belonging to a university, so students are more likely to seek treatment at this clinic. In addition, dense population and interaction between individuals who have good health status on campus or residency area may be a risk factor of pharyngitis, allowing the subjects in this study to be mostly students.<sup>8</sup> Hence, this may be a factor that caused *Streptococcus pyogenes* colonies were not found in this study.

In this study, Centor criteria was used in subjects selection. It consists of fever above 38.5°C, enlarged cervical lymph nodes, tonsillar exudates, without the presence of coughing.<sup>9</sup> Although the Centor criteria are believed to predict the streptococcal pharyngitis, but a study conducted by Roggen et al.<sup>10</sup> indicated that the Centor criteria are not effective in predicting the presence or absence of *Streptococcus pyogenes* from throat swabs in children. Therefore the study still includes all acute pharyngitis patients to become research subjects although they did not meet all the

Centor criteria.<sup>10</sup>

In laboratory testing, the specimens were planted on blood agar medium, and incubated for 24 hours to observe the growth of colony and the type of hemolysis formed. Although  $\beta$ -hemolytic colonies were found in blood agar media, but in most of the gram staining, the bacteria found were gram-negative. This can be due to gram-negative such as *Haemophilus influenzae* and *E. coli*, including the normal flora in the oropharynx, have characteristics of  $\beta$ -hemolysis.<sup>11</sup> From the streptococci found in gram staining, no colonies were sensitive to bacitracin. This might be because the streptococci found may not be *Streptococcus pyogenes*, but were *Streptococcus agalactiae* or *Streptococcus anginosus* which also have the characteristics of  $\beta$ -hemolysis and residential flora in the throat, resulted in the colonies found were not sensitive to bacitracin.<sup>11</sup>

Based on the survey in Jordan, 60% of people have poor knowledge on antibiotic resistance, as well as the behavior of antibiotics without prescription to treat specific symptoms, especially sore throat.<sup>3</sup> Hence, it was suggested to conduct public education about the use of antibiotics, especially to students, in order to reduce the rate of antibiotic treatment without prescription in the community.

The entire sampling and laboratory testing in this study was conducted in accordance with the standard procedures and carried out by trained staff, but do not exempt the possibility of error that *Streptococcus pyogenes* did not grow in blood agar medium. Further research can also be done with a larger scale, in order to obtain a more accurate percentage that can be compared to previous studies.

In conclusion, this study found no colonization of *Streptococcus pyogenes* in throat swabs of acute pharyngitis patients in Padjadjaran Clinic

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