

COMPARISON OF EXAMINATION RESULT OF STREPTOCOCCUS RESULTS β HEMOLYTICUS IN THROAT SWAB CULTURE METHOD AND RAPID ANTIGEN DETECTION TEST (RADT) IN TONSILLITIS PATIENT

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ABSTRACT

Tonsillitis can be caused by bacteria and virus. The bacteria that most commonly causes tonsillitis is Streptococcus β hemolytic. Diagnose of tonsillitis is very important to ensure the cause in order to conduct appropriate treatments, so avoid unnecessary use of antibiotics. Diagnostic test that can be applied to determine the causes of tonsillitis are throat swab culture method and RADT. The purpose of this study was to investigate the presence of Streptococcus β hemolyticus as the cause of tonsillitis using throat swab culture method and RADT. This study was observational analytic with cross sectional approach. Patients who met inclusion criteria and exclusion criteria then tested using throat swab culture and RADT. Data obtained in this research was processed with statistical analysis techniques. Data did not distributed normally using nonparametric test, i.e. Mann-Whitney test. In this research obtained 30 samples tonsillitis patient, which tested by culture and RADT methods. Results between culture and RADT compared. Result from culture method obtained 11 samples of patient was positive Streptococcus β hemolyticus and 16 samples of patient was positive Streptococcus β hemolyticus of RADT method. Statistical analysis showed that there was significant differences between the examination result of throat swab method and RADT.

Keywords: rapid antigen detection test; streptococcus β hemolyticus; tonsillitis; throat swab culture

INTRODUCTION

Diseases of the palatine tonsils (tonsils) are a common problem found in children. Tonsillitis sufferers are patients who often come to the practice of ear, nose, throat–head and neck surgery (ENT-KL), pediatricians, and other health care settings (Brodsky, 2006). Epidemiological data on ENT diseases in 7 provinces in Indonesia in 1994-1996, the prevalence of chronic tonsillitis was 4.6%, the highest after acute nasopharyngitis (3.8%). One of the roles of the laboratory in treating tonsillitis is to help establish the diagnosis of tonsillitis. There are several examination methods that can be carried out, including swab culture examination, Gram staining, Rapid Antigen Detection Test (RADT) examination and serological examination by detecting the presence of antigens or antibodies / immunoglobulins in the blood. The culture method is still the gold standard for diagnostic examination for the detection of group A Streptococcus β hemolyticus with an accuracy rate of 90-95% (Steer et al., 2007). Culture examination can provide a more accurate picture of the cause of tonsillitis. Culture examination can help reduce unnecessary antibiotic administration in tonsillitis patients (Rahajoe et al., 2010). The disadvantages of this method include the high cost and the time it takes to find out the results (1-2 days) (Aalbers, 2011), so this will cause delays in starting treatment (Aalbers et al., 2011).

Time efficiency in examining tonsillitis so that it does not become chronic is very important, so it is necessary to develop a fast and safe method to detect tonsillitis quickly and early, one of which is the RADT technique. Researchers are interested in conducting research on comparing the results

of throat swab culture examinations with RADT examinations in patients suffering from tonsillitis because the RADT technique is fast. The place of this research was carried out at the Microbiology Laboratory of Duta Bangsa University Surakarta. The aim of this study was to determine the results of examination of the bacteria *Streptococcus β hemolyticus* using the throat swab culture method for tonsillitis.

METHOD

This type of research is observational analytical research with a cross sectional approach, namely research that aims to compare the results of two examination methods. In this study, suspects with tonsillitis who had their throats checked also had throat swab cultures and RADT *Streptococcus β hemolyticus* examined. The sample materials used were throat swabs and IIT reagents / dipstick tests from the factory. The medium used in this study was selective *Streptococcus* agar media, Mueller Hinton Agar (MHA), antibiotic bacitracin, brain heart infusion (BHI) and Blood Agar Plate (BAP). The chemicals used are buffer, distilled water, sterile sodium chloride (NaCl) and Gram stain. The tools used in this research were dropper pipettes, timers, sterile Petri dishes, thermometers, tongue depressors, sterile test tubes, sterile cotton swabs, tube needles, cotton swabs, Erlenmeyer flasks, spirit lamps, test tube racks, glass objects, microscopes, tweezers, labels, ovens, autoclaves, incubators, candle hoods.

RESULTS AND DISCUSSION

This research was carried out in the microbiology laboratory at Duta Bangsa University Surakarta with the aim of describing the sensitivity of culture examination and rapid antigen detection test (RADT). After conducting preliminary observations, 30 respondents were obtained as the research sample. Next, an immunoserological examination was carried out using the rapid antigen detection test (RADT) method, while the culture examination was carried out by seeding on Blood Agar Plate media by observing the colonies and growth period of beta hemolytic *Streptococcus* bacteria plus 5-10% CO₂ and incubation for 24 hours at a temperature of 37°C. The subjects of this study were patients with suspected tonsillitis who came to Saras Mustika Clinic for the period March to August 2023. The research material was throat swabs from patients with suspected tonsillitis. Samples for immunoserological examination are directly examined using RADT. Interpret RADT results directly by looking at the pink line on 'control' I and the line on 'Test' (T) then the result is Positive and If there Is a pink line on 'control' I and there Is no pink line on ' Test' (T), then the result is negative. Meanwhile, culture is said to be positive if there is colony growth for β-hemolytic *Streptococcus*, while negative if there is no growth or growth of colonies from other species.

Table 1.

Sample distribution based on the results of the RADT throat swab examination

Hasil metode RADT	f	%
Positif	16	53,3
Negatif	14	46,7

Table 1 it can be explained that of the 30 research samples, 16 people (53.3%) had positive RADT throat swab examination results (53.3%) and negative results for 14 people (46.7%).

Table 2.

Sample distribution based on the results of throat swab examination using the Culture method		
Hasil metode Kultur	f	%
Positif	11	36,7
Negatif	19	63,3

Table 2 it can be explained that of the 30 research samples, 11 people (36.7%) had positive throat swab examination results (36.7%) and negative results for 19 people (63.3%).

Data Analysis

Data Normality Test

The data normality test was carried out using the Kolmogorov-Sminov test. This test aims to test whether the data distribution is in a normal distribution or not. The output of the test results is by looking at the magnitude of the significance value (Asym.sig.). If the significance value is > 0.05 then the data is in a normal distribution, and if the significance value is < 0.05 then the data is not in a normal distribution. (Riwidikdo and Handoko 2013).

Table 3.
Kolmogorov-Smirnov test

One-Sample Kolmogorov-Smirnov Test			
		Swab tenggorok	RADT
N		30	30
Normal Parameters ^{a,b}	Mean	1.47	1.63
	Std. Deviation	.507	.490
Most Extreme Differences	Absolute	.354	.406
	Positive	.354	.269
	Negative	-.320	-.406
Kolmogorov-Smirnov Z		1.941	2.224
Asymp. Sig. (2-tailed)		.001	.000
a. Test distribution is Normal.			
b. Calculated from data.			

Table 3, it can be explained that in the One-Sample Kolmogorov-Sminov test the culture method was obtained with a significance of $0.000 < 0.05$, and the RADT method with a significance of $0.001 < 0.05$. It was concluded that the data was not in a normal distribution so further data analysis was carried out by carrying out non-parametric statistical tests.

Mann-Whitney test

The Mann-Whitney test is a non-parametric statistical test to determine whether there is a difference in a parameter from two independent samples (Riwidikdo 2013).

Table 3.
Mann-Whitney test.

Test Statistics ^b	
	Swabtenggorok
Mann-Whitney U	27.500
Wilcoxon W	93.500
Z	-3.833
Asymp. Sig. (2-tailed)	.000
Exact Sig. [2*(1-tailed Sig.)]	.000 ^a
a. Not corrected for ties.	
b. Grouping Variable: RADT	

From the Mann-Whitney test it appears that the Asymp. Sig. namely 0.000, which means probability <0.05 . Thus, H_0 is rejected or there is a significant difference between the results of the throat swab examination using the culture method and RADT.

Based on the research results, it was found that the sensitivity of the RADT examination reached 53% and the culture examination was 37%. This means that the results of the examination showed that 11 of the 30 throat swab samples (36.7) examined, both culture and RADT results were both positive, then no samples from RADT were negative or culture positive, while 5 samples from RADT were positive or culture negative and the remaining 19 samples were negative (culture and RADT). This is caused by several factors that influence the results, including: The results of the RADT examination are negative or the culture is positive. This can occur because the amount of antigen in the patient does not meet the sensitivity of the rapid antigen detection test, namely $3,906 \times 10^5$ CFU/ml, therefore the RADT test results are negative. A positive culture was found to be hemolytic β Streptococcus because the patient had just been infected with tonsillitis so the hemolytic β Streptococcus bacteria could be detected.

Five samples in the RADT examination were positive and culture negative, this may have occurred because the samples were cultured from dead germs. The patient had previously received treatment using antibiotics. The results of the RADT examination were positive because the patient's immunoglobulin or antibodies were still detected in the patient's body so that the RADT examination was positive for Streptococcus group A. Other factors besides those mentioned above, namely the possibility that the number of samples and locations taken from the patient's throat swab are very small or that bacteria are not carried. The distance from the hospital to the microbiology laboratory at Universitas Duta Bangsa Surakarta can affect the results of the culture. When taken to the microbiology laboratory, it is best to put the sample in Amies media so that the sample remains in its original condition. The average sensitivity and specificity value of the RADT examination (61%) is higher than that of the culture examination (42%). RADT examination has a higher sensitivity (61%) than culture. This shows that this method provides the lowest false positive results. Based on these results, it can be stated that the RADT examination has a higher positive predictive value, even though the culture method is the gold standard diagnostic examination for the detection of group A β -hemolytic Streptococcus with an accuracy rate of 90-95% (Steer et al 2007).

The advantages of examination using the serological rapid antigen detection test method include a shorter examination time (10 minutes), it is fast and can be useful in helping diagnose tonsillitis because it has a high specificity of 100%, meaning the ability of the rapid antigen detection test to diagnose patients with results negative and true not suffering from tonsillitis is 100% (Brunton and Pichicero, 2006). These results are in accordance with research conducted by Agustia Sinta Desi et al entitled Determining Group A Streptococcus as the cause of pharyngitis in children using the McIsaac Score and Rapid Antigen Detection Test (RADT) in an effort to use antibiotics wisely, which concluded that it appears that RADT is more sensitive than assessment using McIsaac Score. This is in accordance with data which states that the McIsaac Score has a sensitivity of 71% and a specificity of 77% (Widagdo, 2007), where this value is smaller than RADT which has a sensitivity of 80-95% and a specificity of 70-95% (Brunton and Pichicero, 2006). Examination using the McIsaac score followed by examination using RADT can be used to determine group A Streptococcus as the cause of pharyngitis (Agustia, 2013).

The results of this study are different from another study entitled Comparison of streptococcus bacteria in tonsillopharyngitis swabs with blood which concluded that, from the Streptococcus culture results, 15 samples (30%) were obtained, and 35 (70%) were negative for Streptococcus culture. From blood culture, 13 (32.5%) positive results were obtained and 27 (67.5%) negative cultures were obtained, both non-streptococcus. In this study, an average score of 3-5 symptoms was obtained. Further research needs to be carried out for the RADT (Rapid Antigen Detection Test) test on serum samples in patients with tonsillopharyngitis fever. The limitation of this study is that the researcher did not interview research respondents directly regarding whether the patient before the throat swab had received antibiotic therapy, had a history of tonsillitis surgery and the age of the patient. However, there are several factors that support the implementation of this research, namely members and employees in the RSDM clinical microbiology laboratory who are cooperative during the research so that this research can be carried out and researchers can also obtain the samples needed.

The results of the study showed that there was a significant difference in results between the culture method throat swab examination and the RADT examination. It was proven from the results of the Mann-Whitney test that the results of the culture method were obtained with a significance of $0.000 < 0.05$, and the RADT method with a significance of $0.001 < 0.05$. This research is not in accordance with the hypothesis that the researchers expected, namely that there is a difference between the examination of β -hemolytic Streptococcus bacteria using the throat swab method and the rapid antigen detection test in patients suffering from tonsillitis.

CONCLUSION

Of the 30 samples from the throat swab examination using the culture method, 11 culture samples were positive for Streptococcus β hemolyticus bacteria and from the results of the RADT throat swab examination, 16 samples were positive for Streptococcus β hemolyticus bacteria. So it can be concluded that, from the Wilcoxon test, a probability value with a significance of $0.025 < 0.05$ is obtained. Thus, there is a significant difference between the results of the examination for Streptococcus β hemolyticus bacteria using the throat swab method and RADT in tonsillitis patients.

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