


The Sensitivity Of Ciprofloxacin And Amoxicillin To Bacteria That Cause Chronic Tonsillitis In West Of Nusa Tenggara Provincial Hospital

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Article Info	ABSTRACT
<p>Keywords: Chronic tonsillitis, Bacteria, Ciprofloxacin, Amoxicillin.</p>	<p>Chronic tonsillitis is a condition of enlargement tonsil and accompanied by repeated infections. Chronic tonsillitis is most commonly caused by Gram-positive bacteria such as <i>Staphylococcus aureus</i>. Provision of broad-spectrum antibiotics such as Ciprofloxacin and Amoxicillin is able to inhibit the growth of aerobic bacterias that cause chronic tonsillitis. The main objective of this study is to determine the comparison of Ciprofloxacin and Amoxicillin sensitivity against bacterias causes of chronic tonsillitis Departement of West Nusa Tenggara General Hospital. The design of this study is observation study with cross sectional approach. Forty-nine people with chronic tonsillitis had a throat swab. The sensitivity test was examined by dilution methods for Ciprofloxacin and Amoxicillin antibiotics. The result of the study was analyzed by Chi Square (X²) test with a significance level of p value <0.05. The 49 chronic tonsillitis patients who had throat swab, the most common cause of chronic tonsillitis was <i>Staphylococcus aureus</i> 36 isolates (73,5%). Sensitivity to ciprofloxacin was 41 isolates (83,7%) with an inhibitory zone 28 mm and sensitivity to amoxicillin was 8 isolates (16,3%) with an inhibitory zone 20 mm, Ciprofloxacin is more sensitive than Amoxicillin (p<0,05). Ciprofloxacin was more sensitive to bacterias that cause chronic tonsillitis.</p>
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INTRODUCTION

Chronic tonsillitis is an inflammation of the tonsils that persists as a result of recurrent acute or subclinical infections. Tonsils are enlarged due to hyperplasia parenchyma or fibronoid degeneration with tonsil crypt obstruction but relatively small *tonsils can* also be found due to chronic cystic formation. Chronic tonsillitis can be caused by re-attacks of acute tonsillitis resulting in irreversible damage to the tonsils, or this damage can occur when the resolution phase is imperfect (Ramadan, F. et al, 2017).

From the results of a study conducted by Ivan 2013 in children aged < 18 years, the main complaint of chronic tonsillitis patients in children that was most found in this study was recurrent swallowing pain as much as 64%. This occurs due to inflammation of the tonsils which causes uncomfortable complaints to patients in the form of pain when swallowing (Ivan, 2013). From the epidemiological data of *the World Health Organization* (WHO) it is

estimated that 287,000 children under 15 years of age have tonsillectomy (tonsil surgery), with or without adenoidectomy. About 248,000 children or with a prevalence of 86.4% had tonsillectomy and another 39,000 or with a prevalence of 13.6% underwent tonsillectomy alone.

Tonsillitis can be caused by several types of bacteria and viruses. Acute tonsillitis and chronic tonsillitis have different causes, namely acute tonsillitis is more often caused by group A germs *Streptococcus β-hemolyticus*, *Pneumococcus*, *Streptococcus viridans* and *Streptococcus pyogenes*, while chronic tonsillitis germs cause the same as acute tonsillitis but sometimes the germ pattern changes to germs of the gram-negative group. This difference in bacterial patterns will be related to the selection of antibiotics used in patients and will also be related to the prognosis and long-term complications that may be suffered by children with chronic tonsillitis (Nizar, M. et al, 2016).

Treatment of chronic tonsillitis with antibiotics is divided into several groups, such as the penicillin group, cephalosporins, clindamycin, and the fluoroquinolone group (Palandeng, A, Ch. T, et al 2012). One of the antibiotics used for the therapy of chronic tonsillitis is ciprofloxacin. Ciprofloxacin is a broad-spectrum antibiotic, a group of fluoroquinolones commonly used in the therapy of infections caused by both gram-positive and gram-negative bacteria, including *E. coli*, *Shigella*, *Salmonella*, *Enterobacter*, *Staphylococcus*, *Clostridium*, *Eubacterium*, *Brucella alcaligenes*, *Aeromonas*, *Pasteurella*, *Mycobacterium* and *Actinomyces* (Zainuddin, 2019). The mechanism of action of fluoroquinolone compounds inhibits the formation of bacterial DNA by inhibiting topoisomerase II (DNA gyrase) and topoisomerase IV bacteria. DNA gyrase inhibition prevents the relaxation of the DNA coil necessary for transcription and normal replication (Katzung, 2014).

Amoxicillin is a prototype of the aminopenicillin group which is intended to be in the beta-lactam antibiotic group. Works by inhibiting the formation of bacterial cell walls. The administration of amoxicillin is indicated for serious infections due to susceptible organisms, such as *Streptococcus beta-hemolytic*, *Streptococcus pneumonia*, *Streptococcus non hemolytic*, *Escherichia coli*, *Klebsiella sp*, causes of chronic tonsillitis (Isnawati, A. et al, 2006). From the results of a study conducted by Sembiring in 2013 stated that the antibiotic amoxicillin was effective against gram-positive bacteria chronic tonsillitis by 53.33% and ciprofloxacin was sensitive to bacteria that cause chronic tonsillitis by 13.33% (Sembiring, O. et al, 2013).

The sensitivity of bacteria to antibiotics generally varies by country. Based on bacterial sensitivity tests to antibiotics in several countries from 2009 to 2011, it was reported that the antibiotics with the highest resistance were amoxicillin, tetracycline, and erythromycin while the antibiotics with the highest sensitivity were ciprofloxacin, gentamicin, and ofloxacin in patients with chronic tonsillitis, chronic otitis media, chronic sinusitis, chronic adenoiditis (Kurman H, Sonia S, 2011). From the results of research conducted by Babaiwa in 2013, the use of penicillin group antibiotics, one of which is amoxicillin, has experienced resistance. Many antibiotics are used for chronic tonsillitis therapy, but the resistance level is also high, therefore some antibiotics that are still sensitive must be tested for sensitivity in order to be used as an effective treatment of choice (Panga, Anvita, 2016). Based on the description

above, researchers are interested in knowing the comparison of the sensitivity of ciprofloxacin and amoxicillin to bacteria that cause chronic tonsillitis at the West Nusa Tenggara Provincial General Hospital.

METHODS

The research is *analytical observational* with a *cross sectional* approach to determine the comparison of the sensitivity of amoxicillin and ciprofloxacin to germs that cause chronic tonsillitis in the ENT Poly of NTB Provincial Hospital. The population of this study was all chronic tonsillitis sufferers who conducted an examination at the poly of the NTB Provincial Hospital from March to April. The sample was 49 people in the population who met the inclusion criteria. The sampling technique is carried out by *accidental sampling*. Primary data collection was carried out by means of bacterial culture from throat swabs of chronic tonsillitis patients. Each throat swab from patients must identify the type of bacteria that causes chronic tonsillitis in swab cultures. The culture results or bacteria then tested for sensitivity to the antibiotics Amoxicillin and Ciprofloxacin by diffusion method. The antibiotic variable data amoxicillin and ciprofloxacin were analyzed using Chi-Square with a significance level of $p < 0.05$. The collected data will be processed and analyzed using SPSS software.

RESULTS AND DISCUSSION

Identify of Bacteria That Cause Chronic Tonsillitis

Based on the identification of the type of bacteria that causes chronic tonsillitis in swab cultures of 49 patients, the most types of bacteria are *Staphylococcus aureus* as many as 36 isolates (75.3%), then *S. streptococcus Sp* as many as 1 isolate (2.0%), *Streptococcus Epidermis* as many as 6 isolates (12.2%), *Streptococcus pyogenes* and *Klebsiella pneumonia* each as many as 3 isolates (6.1%).

Table 1.1 Types of Bacteria That Cause Chronic Tonsillitis

Species of bacteria:	Sum	Persentase	Total
Staphylococcus Aureus	36	73.5%	49
Streptococcus Sp	1	2.0%	
Klebsiella pneumonia	3	6.1%	
Streptococcus pyogenes	3	6.1%	
Streptococcus Epidermis	6	12.2%	

Sensitivity of antibiotics ciprofloxacin and amoxicillin to bacteria that cause chronic tonsillitis

In Table 1.2, the distribution of ciprofloxacin and amoxicillin sensitivity to bacteria that cause chronic tonsillitis showed higher sensitivity of ciprofloxacin than amoxicillin. Based on table 3, the most bacteria sensitive to antibiotics ciprofloxacin and amoxicillin are *Staphylococcus aureus* as many as 5 isolates for amoxicillin and 28 isolates for ciprofloxacin

Table 1.2. Antibiotic Sensitivity in Chronic Tonsillitis Diffecting Bacterias

Antibiotic Sensitivity	Bacteria		Total	P value
	Gram Positive	Gram Negative		
Ciprofloxacin	35	6	41	0,023

Antibiotic Sensitivity	Bacteria		Total	P value
	Gram Positive	Gram Negative		
Amoxicillin	(71,4%)	(12,2%)	(83,7)	
	4	4	8	
	(8,2%)	(8,2%)	(16,3)	
Total	39	10	49	
	(79,6%)	(20,4%)	(100%)	

Table 1.3. Sensitivity of Ciprofloxacin and Amoxicillin Antibiotics To Bacteria Causing Chronic Tonsillitis.

Bacteria	Ciprofloxacin			Amoxicillin		
	S	I	R	S	I	R
Staphylococcus Aureus	32	5	6	8	9	24
Streptococcus Sp	-	-	1	-	-	1
Klebsiella pneumonia	3	-	-	-	1	2
Streptococcus pyogenes	3	-	-	1	-	2
Streptococcus Epidermis	3	2	1	3	1	2

Based on the results of bacterial identification from 49 throat swab respondents, most of the germs that cause chronic tonsillitis are *Staphylococcus aureus* as many as 36 isolates (73.5%). This result is not much different from the study conducted by Al-Roosan on a study of 100 patients with an age range of 3-35 years who suffered from chronic tonsillitis at the Princess Haya Jorjia hospital in 2008 obtained pathogenic bacteria on the tonsil surface, namely *Staphylococcus aureus* as much as 32% isolates, *Streptococcus β haemolyticus group* as much as 12%, and *E.coli* as much as 4% (Nizar. et al, 2016). Meanwhile, research conducted by Nasiriyah in 2016 found that the bacteria that cause chronic tonsillitis are *Staphylococcus aureus* 62 (64.58%) and *Streptococcus Pyogenes* 34 (35.42%) (Baidaa, 2016).

The results of this study are supported by other studies that the bacterium that causes the most chronic tonsillitis is *Staphylococcus aureus*. This is because *Staphylococcus aureus* is a gram-positive facultative bacterium that is often found around the skin, soft tissues, respiratory, bones, joints, and endovascular for infectious wounds. So this bacterium is quite easy to become pathogenic when the body's immunity is weakened in these areas. In addition, this bacterium colonizes most in children compared to adults, this is due to the habit of children who have more frequent contact with respiratory secretions, for example inserting foreign objects into their mouths or noses (Nizar. et al, 2016).

In the interest of therapy for cases of chronic tonsillitis the need for antibiotic sensitivity tests to find out the most appropriate antibiotic for the treatment of chronic tonsillitis. The sensitivity test carried out is a sensitivity test with the paper disc diffusion method. This method is a very effective method and a minimum error rate due to its easy way of working and providing fast results in sensitivity tests (Soleha, 2015). To determine the sensitivity of an antibiotic in view of the size of the inhibitory zone of an antibiotic, from the results of sensitivity tests with the paper disc diffusion method, the average size of the ciprofloxacin

and amoxicillin inhibitory zones was obtained, including ciprofloxacin (28 mm) and amoxicillin (20 mm).

These results are almost similar to Arga's 2014 study of 110 isolates conducted sensitivity tests on 17 antibiotics, the size of the inhibitory zone for ciprofloxacin was 28 mm while amoxicillin was 20 mm (Arga, 2014). This growth inhibition zone shows the sensitivity of bacteria to anti-bacterial materials, the wider the diameter of the barrier zone formed, the more sensitive the bacteria are to an antimicrobial (Asriadi, 2012).

The results showed that ciprofloxacin is more sensitive to gram-positive bacterial bacteria (71.4%) than gram-negative bacteria (12.2%). This is because the antibiotic ciprofloxacin is a broad-spectrum antibiotic commonly used in the therapy of infections caused by gram-positive and gram-negative bacteria, including *Staphylococcus aureus*, *Streptococcus pneumoniae*, *E. coli*, *Shigella*, *Salmonella*, *Enterobacter*, *Clostridium*, *Eubacterium*, *Brucella alcaligenes*, *Aeromonas*, *Pasteurella*, *Mycobacterium* and *Actinomyces*. This fluorochinone compound kills bacteria (bactericides) by binding to the DNA gyrase enzyme needed by DNA to change from a double spiral shape to a single spiral form at the time of cell division (Meniasti, R. et al, 2015). The mechanism of action of fluorochinone compounds inhibits the formation of bacterial DNA by inhibiting topoisomerase II (DNA girase) and topoisomerase IV bacteria. DNA gyrase inhibition prevents the relaxation of the DNA coil necessary for transcription and normal replication (Katzung, 2014).

The sensitivity of amoxicillin is lower than that of ciprofloxacin, this is due to the occurrence of a resistance reaction to a bacterium that causes chronic tonsillitis. The resistance mechanism occurs due to the presence of two resistance reactions, namely natural and acquired resistance. Natural resistance is inherited while acquired resistance is resistance influenced by several factors, the most frequent factor is the widespread and improper use of antibiotics (Gina, 2017).

Of the 24 respondents who experienced resistance to amoxicillin, it was most likely caused by the resistance reaction obtained because there were still respondents who were still sensitive to amoxicillin, namely as many as 8 isolates (16.3%) of respondents. As for the work of bacteria in causing the resistance mechanism of an antimicrobial where bacteria produce the enzyme betalactamase, changes in PBP and bacterial autolysin enzymes do not work so that bacterial tolerance arises to antibiotics, bacteria that are resistant to beta-lactam antibiotics have 3 resistance mechanisms, namely antibiotic digestion with beta-lactamase so as to reduce the penetration of antibiotics to bind to proteins transpeptidase, and decreases the affinity of the bond between_ the binding protein and antibiotic compounds (Nurmala, 2015).

From the results of the study, ciprofloxacin is very sensitive to *Staphylococcus aureus* bacteria as many as 41 isolates. The results of this study are in line with research conducted by Agus in 2014 stating that ciprofloxacin is sensitive to *Staphylococcus aureus* bacteria by (35%) to *Staphylococcus aureus* bacteria (Agus, 2014). This is because *Staphylococcus aureus* bacteria are gram-positive bacteria that have a permeable cell wall that makes it

easier for antimicrobial substances to penetrate cell walls and inhibit bacterial growth (Katzung, 2014).

So based on the results of sensitivity test studies that have been carried out, the results that ciprofloxacin sensitivity is higher than amoxicillin, this is because amoxicillin has experienced an acquired resistance reaction this is due to the use of antibiotics that do not use a doctor's prescription and do not remain as indicated (Numala, 2015). Ciprofloxacin is very sensitive to the bacterium *Staphylococcus aureus*. Based on the results of the Chi Squared Test (X^2) Two Samples obtained a significant value of 0.023 ($p < 0.05$), which means that there is a significant difference between the sensitivity of the antibiotics ciprofloxacin and amoxicillin in chronic tonsillitis patients.

CONCLUSION

The most bacteria that cause chronic tonsillitis are *Staphylococcus aureus* as many as 36 isolates (73.5%), while *Streptococcus Sp* as many as 1 isolate (2.0%), *Streptococcus Epidermis* as many as 6 isolates (12.2%), *Streptococcus pyogenes* and *Klebsiella pneumonia* each as many as 3 isolates (6.1%), based on the results of the *Chi Square Test* namely obtained a significant value of 0.023 ($p < 0.05$), ciprofloxacin has a higher sensitivity than amoxicillin to bacteria that cause chronic tonsillitis at the Provincial General Hospital (RSUP) of West Nusa Tenggara.

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