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Evaluation of the use of Antibiotics Quantitatively and Qualitatively in Pharyngitis Patients at Banda Sakti Public Health Center Lhokseumawe

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ABSTRACT

Pharyngitis is an inflammation of the pharynx that is one of the causes of bacterial infection. Antibiotics are the primary choice of medicine for bacterial infections. The importance of evaluating the use of antibiotics in patients with pharyngitis can reduce the side effects of the drug and prevent the development of resistance. The aim of this study is to evaluate the use of antibiotics in patients with pharyngitis in Puskesmas Banda Sakti City Lhokseumawe quantitatively according to the Defined Daily Dose (DDD) method and qualitatively by the Gyssens method. This study is descriptive. The sampling technique used purposive sampling with a time-limited sampling method. The measurement is a patient medical record from July 2021 to June 2022, with 89 samples obtained. The result showed that the quantitative use of antibiotics by the DDD method obtained antibiotics with the highest total DDD of 10.35 DDD/1000 patients, while the qualitative evaluation using the gyssens method for amoxicillin was classified as category IIIB because the gift was too short, cefadroxil was classified as category IVB because other antibiotics were safer, ciprofloxacin was classiefied as category V because it is not indicated. This study concludes that the use of antibiotics quantitatively using the DDD method found the highest total DDD was amoxicillin, while the evaluation of the use of antibiotics qualitatively classified inappropriate.

1. Introduction

Pharyngitis is inflammation that occurs in the pharynx and often spreads to surrounding tissues. Pharyngitis is an inflammation of the pharynx wall caused by a bacterial, viral, fungal infections, etc. Bacterial infections are responsible for the majority of pharyngitis (Harberger & Graber, 2022). In Indonesia, around 40 million people per year visit health services because they experience pharyngitis (Kementerian Kesehatan RI, 2014). According to the National Ambulatory Medical Care Survey (NAMCS), in the United States (US) approximately 200 visits to the doctor per 1000 population per year come due to upper respiratory tract infections, including acute pharyngitis (Napitupulu et al., 2018). Bacterial pharyngitis is pharyngitis caused by a bacterial infection. Antibiotics are the main drug of choice for bacterial infections.

Improper use of antibiotics can cause resistance problems. Appropriate use of antibiotics can be through consideration of the impact that will arise and the spread of resistant bacteria (Kementrian Kesehatan Republik Indonesia, 2021). The threat of antibiotic resistance to world health is growing. The European Center for Disease Prevention and Control reports that around 33,000 people each year develop drug-resistant infections and die as a result (European Court of Auditors, 2019). CDC (Centers of Disease Control) data shows that in the US there are more than 2.8 million threats of

antibiotic resistance every year (CDC, 2019). The number of antibiotic resistance in Aceh is not known with certainty, but there is research conducted by (Risqullah, 2018) in a hospital in Aceh, it is said that the use of antibiotics in this study is still less rational (Risqullah, 2018).

Therefore, the use of antibiotics must be appropriate according to the pattern of use. The use of antibiotics can be identified by conducting quantitative and qualitative evaluations. A quantitative assessment of antibiotic use is carried out to determine the amount of consumption of antibiotic use according to the ATC/DDD (Anatomical Therapeutic Chemical/Defined Daily Dose) method World Health Organization (World Health Organization, 2020). Meanwhile, a qualitative assessment of the use of antibiotics was carried out to assess the quality or appropriateness of antibiotic therapy according to the Gyssens method (Sitompul et al., 2016).

Therefore, it is necessary to evaluate the use of antibiotics to assess whether the use of antibiotics is appropriate based on the ATC/DDD method and the Gyssens method. The purpose of this study was to evaluate the use of antibiotics quantitatively and qualitatively at the Banda Sakti Health Center, Lhokseumawe City.

2. Materials and Methods

This type of research is a retrospective descriptive study. The research was conducted from September 2022 to January 2023 at the Banda Sakti Health Center in Lhokseumawe City. The population in this study were pharyngitis patients for the period 1 July 2021–30 June 2022, totaling 113 people. In taking the sample, the technique used is purposive sampling, and it is necessary to determine inclusion and exclusion criteria in sampling so that the sample criteria do not deviate from the population. Inclusion criteria in this study included: adults aged at least 18 years and over; pharyngitis patients who received antibiotics; and medical records that were clearly legible. The sample is calculated using the Slovin formula as follows:

$$n=\frac{N}{n.d^2+1}$$

$$n=\frac{N}{n.d^2+1}=\frac{113}{113.(x0.05)^2+1}=88{,}1 \rightarrow 89 \text{ participants (in this research)}$$

The research process carried out in this study is as follows : Collect a list of patients with pharyngitis in Puskesmas Banda Sakti City of Lhokseumawe who receive antibiotic therapy, then record medical records. After collecting medical records and adjusting to inclusion criteria. Copy the data and then insert it into the Data Collection Sheet. The data collected from the patient's medical records are: medical record number, the identity of the patient is named, gender, age. Characteristic data are blood pressure, height, weight, temperature, diagnosis. Antibiotic therapy is given as type, dose, route, interval frequency and duration of administration. Evaluate the data quantitatively first by incorporating it into the DDD/1000 patients formula :

$$\frac{\text{Total DDD in 1 year x 1000}}{\text{Total patients in1 year}}$$

Evaluate the data qualitatively by following the flow of gyssens from category VI to category 0, where if the data stops in category VI-I, then the administration of antibiotics is inappropriate, but if it stops in category 0, then the delivery is correct.

Health Research Ethics Commission, Faculty of Medicine, Malikussaleh University has granted this study ethical feasibility, with number: 021/KEPK/FKUNIMAL-RSUCM/2022. While the exclusion criteria were people who had tonsillopharyngitis and laryngopharyngitis.

3. Results and Discussion

3.1 Quantitative Use of Antibiotics

Quantitative assessment of antibiotics in pharyngitis patients during the period July 2021-June 2022 using the DDD (Defined Daily Dose) method revealed that of the 3 types of antibiotics used in pharyngitis patients at the Banda Sakti Health Center, amoxicillin had the highest total DDD/patients value. The high use of amoxicillin in health services is because amoxicillin is an antibiotic used to treat mild to moderate cases of infection, especially in pharyngitis (Departemen Kesehatan RI, 2005).

There are several classes of antibiotics proven to be effective in treating pharyngitis, namely the penicillin, cephalosporin, and quinolone groups. The administration of this therapy is in accordance with the antibiotics given by the Banda Sakti Health Center, namely amoxicillin for the treatment of pharyngitis. Amoxicillin is the first-choice antibiotic given for pharyngitis, which is one of the reasons for its high use (Departemen Kesehatan RI, 2005). These outcomes are in line with studies carried out by (Amesta, 2021) and (Gusdilla, 2019), where amoxicillin has the highest DDD value compared to other antibiotics.

The use of amoxicillin needs to be monitored by related parties to determined whether it is used appropriately to avoid the occurrence of resistance, because excessive use of antibiotics can cause resistance. However, the results of the DDD/patients calculation are not a benchmark in determining the efficacy of a drug and are not a benchmark in determining the resistance of a drug, so it is necessary to evaluate various aspects. A large quantity of antibiotic use indicates a higher probability of these antibiotics experiencing resistance, but a low quantity of antibiotic use indicates that doctors or health workers are becoming more selective when giving drugs to patients, so as to approach the provision of proper antibiotic administration and prevent the possibility of resistance (Mahmudah et al., 2016).

3.2 Qualitative Use of Antibiotics

The final interpretation of the evaluation of the Gyssens method is that categories VI-I are said to be inappropriate, while categories 0 are said to be appropriate (Kementrian Kesehatan Republik Indonesia, 2015). The results of research at the Banda Sakti Health Center in Lhokseumawe City showed that the use of antibiotics belonging to category III B was amoxicillin. In category III B, namely, the administration was too short; amoxicillin was given to patients for 3 days, while according to Pharmaceutical Care for Respiratory Tract Infection Diseases by the Indonesian Ministry of Health 2005, amoxicillin antibiotics are given for 10 days (Departemen Kesehatan RI, 2005). The same thing is also stated in the Minister of Health of the Republic of Indonesia Number 5 of 2014, which states that the administration of amoxicillin antibiotics to pharyngitis patients is given for 6-10 days (Kementerian Kesehatan RI, 2014). These outcomes are in line with studies carried out by Bakhit in 2019, where amoxicillin also occupies category III B in the gyssens method because the duration of use is too short, namely 4 days (Bakhit, 2021).

The reason the doctor at the puskesmas gave amoxicillin for 3 days was that when given the drug, the patient was told to come back after 3 days or finished the medicine if the complaint did not go away, but usually the patient did not come back, and because the stock of amoxicillin was also limited so it was not possible to give amoxicillin for 10 days to one patient. Inappropriate drug dosages can cause various effects on patients. First, if the dosage of the drug prescribed is not correct, then the patient will not get the proper treatment effect related to the disease. The more accurate the dose, the more precisely the antibiotic level will reach the site of infection, conversely if the dose is not correct, the effectiveness of the antibiotic will not be maximized (Tarigan, 2013). Antibiotic misuse carries a number of risks, such as increasing the number of infections caused by resistant pathogenic bacteria, reducing the effectiveness of treatment, and increasing health care costs (Lingga et al., 2021).

The use of antibiotics belonging to category IV B according to the Gyssens method is cefadroxil, whereas in category IV B, there are other antibiotics or alternatives that are less toxic. The reason the doctor at the puskesmas gave cefadroxil was usually based on the patient's history taking amoxicillin while seeking treatment outside the public health center, and because drug rotation made it impossible to give amoxicillin continuously to patients. Based on the 4th edition of the pharmacology book, it states that the penicillin class is the safest antibiotic and that its levels in the blood do not need to be monitored. May cause some side effects, such as hypersensitivity and diarrhea. Meanwhile, cephalosporins can cause allergic manifestations, bronchial spasms, urticaria (Harvey & Champe,

2016). The penicillin group, namely amoxicillin, its effect is not affected by the presence of food and has milder side effects. Meanwhile, the cephalosporin group is given if there is a bacterial infection for which you really have to use the antibiotic directly or if the disease infection is less effective when using the antibiotic drug amoxicillin (Widyastuti, 2019). However, in this study there were deficiencies, namely not knowing the history of using antibiotics given to patients or whether the patient had a history of allergy to penicillins or not. So it is difficult to say that cefadroxil is not appropriate in its administration and can be used as input for future researchers to further review this matter.

The use that belongs to category V according to the Gyssens method is ciprofloxacin, whereas in category V, the administration of the antibiotic is not indicated. According to Pharmaceutical Care for Respiratory Infection Diseases by the Indonesian Ministry of Health 2005, ciprofloxacin or quinolone group antibiotics are not indicated for pharyngitis patients (Departemen Kesehatan RI, 2005). The same thing is also stated in the RI Minister of Health Number 5 of 2014, that ciprofloxacin or quinolone antibiotics are not indicated for pharyngitis patients (Kementerian Kesehatan RI, 2014). This is also in line with a journal published in PubMed Central entitled recommendations for the management of acute pharyngitis in adults, in which there is no mention of ciprofloxacin antibiotics or the quinolone group being indicated in pharyngitis patients (Cots et al., 2015).

Table 1. Respondent Data Based on Antibiotics

Antibiotics	Frequency (N)	Precentage N (%)
Amoxicillin	36	40,45 %
Cefadroxil	44	49,44%
Ciprofloxacin	9	10,11%
Total (N)	89	100%

The most widely used antibiotic at the Banda Sakti Health Center in Lhokseumawe City was cefadroxil, with a total of 44 people, while the least used antibiotic was ciprofloxacin, with a total of 9 people.

Table 2. Distribution of Antibiotic Use and Calculation of DDD Values for the Period of July 2021 - June 2022

Antibiotics	Code ATC	DDD	Precentage N (%)
Amoxisilin	J01CA04	10,35	43,43 %
Cefadroxil	J01DB05	9,57	40,16%
Ciprofloxasin	J01MA02	3,91	16,41%
Total (N)		23,83	100%

The quantity of antibiotics used in pharyngitis patients using the ATC/DDD method obtained the largest DDD value: amoxicillin at a dose of 10.35 DDD/1000 KPRJ.

Table 3. Distribution of Suitability of Antibiotics Based on Gyssens Method

Antibiotics	0	I	IIC	IIB	IIA	IIIB	IIIA	IVD	IVC	IVB	IVA	V	VI	%
Amoksisilin	0	0	0	0	0	36	0	0	0	0	0	0	0	40,45%
Cefadroksil	0	0	0	0	0	0	0	0	0	44	0	0	0	49,44%
Ciprofloksasin	0	0	0	0	0	0	0	0	0	0	0	9	0	10,11%
Total	0	0	0	0	0	36	0	0	0	44	0	9	0	100%

The characteristics of the use of antibiotics based on the quality of their use are shown in Table 3. The use of antibiotics at the Banda Sakti Health Center in Lhokseumawe City for amoxicillin belongs

to category III B, namely, its use is too brief; cefadroxil is classified in category IV B, namely, there are alternatives or other antibiotics that are safer; and ciprofloxacin is classified as category V because it is not indicated in pharyngitis.

4. Conclusion

Based on the research that has been done, a quantitative assessment according to the ATC/DDD method of the 3 types of antibiotics used in pharyngitis patients at the Banda Sakti Health Center shows that amoxicillin has the highest total score and ciprofloxacin has the lowest. Based on a qualitative assessment using the Gyssens method, the use of antibiotics in pharyngitis patients at the Banda Sakti Health Center is considered inappropriate. In this study, there is a disadvantage, namely, not knowing the history of antibiotic use given to the patient or whether the patient has a history of allergy to the antibiotic or not, which can be used as a suggestion for future researchers to review this issue further.

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Competing Interests

The authors disclose no conflict.

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