

A Comparative Evaluation of the Rationality of Antibiotic Amoxicillin And Cefadroxil In Patients With Pharyngitis

Hedi Diana, Annis Rahmawaty*, Gunawan Firmansyah, Putri Dayana

Institut Teknologi Kesehatan Cendekia Utama Kudus, Indonesia

*Corresponding Author: annisnis24@gmail.com

Abstract. Pharyngitis is caused by viral and bacterial infections. The bacterium that causes pharyngitis is *Streptococcus pyogenes*. Antibiotic use in pharyngitis cases is still reported to be quite high, indicating the potential for irrational antibiotic use. The purpose of this study was to evaluate the comparative use of Amoxicillin and Cefadroxil antibiotics in pharyngitis patients. **Method.** This study was quantitative with a descriptive design. Data were collected retrospectively from the medical records of BPJS pharyngitis patients who received Amoxicillin and Cefadroxil antibiotics at Cahaya Husada Pratama Clinic from January to December 2022. A total of 81 individuals met the inclusion criteria using a purposive sampling method. **Data Analysis:** The collected data were then recorded, grouped, and analyzed. The data were processed using Microsoft Excel and interpreted in tabular form. The results of the data analysis will be presented in descriptive and percentage tables. **Result.** By gender, 58% were female, and 42% were male. Based on age, the most common patients with pharyngitis were 26-35 years old (34.6%). Based on single and frequently used antibiotics, the most commonly used were Amoxicillin 500 mg in 46 patients (56.8%), Amoxicillin 125 mg in 3 patients (3.7%), and Cefadroxil 500 mg in 32 patients (39.5%). The evaluation of antibiotic rationality based on the appropriate drug (96.3%), the appropriate patient (100%), the appropriate indication (96.3%), and the appropriate dosing schedule (95.1%) for Amoxicillin and Cefadroxil. **Conclusion.** A comparison of antibiotic use in patients with pharyngitis found that amoxicillin can be the primary choice, while cefadroxil can be a second-line alternative. Rationality assessment was conducted by comparing the appropriate patient, appropriate drug, appropriate indication, and appropriate medication regimen to national therapeutic standards.

Keywords: Antibiotic, Amoxicillin, Cefadroxil, Comparative, Pharyngitis

INTRODUCTION

Pharyngitis is an upper respiratory tract infection that inflames the entire pharynx (tonsils, palate, uvula) and is caused by viruses and bacteria (Hawks & Black, 2022). Pharyngitis is a febrile inflammation caused by viruses in 70% of cases. A complicated viral infection usually resolves within 3-10 days (Dhrik *et al.*, 2021).

Symptoms of pharyngitis include high fever, a sore throat that can cause difficulty swallowing, vomiting, coughing, and a runny nose (Gustini, 2021). Pharyngitis can be easily transmitted through inhaled droplets or contact with hands contaminated with microbes that enter the respiratory tract. This highly contagious infection makes pharyngitis a leading cause of morbidity and even death worldwide (Kemenkes, 2022).

International studies show that inappropriate antibiotic use is still widespread, especially in primary healthcare facilities, where one-third of antibiotic prescriptions are unnecessary, and some are inappropriate for indications. This leads to irrational antibiotic use and is a major cause of antimicrobial resistance (Song *et al.*, 2025).

Pharyngitis often receives antibiotic therapy, although most cases are self-limiting and do not require antibiotics. Several recent studies report that β -lactam and cephalosporin antibiotics are still the primary treatment options for pharyngitis, especially in primary healthcare settings (Sombuk *et al.*, 2024). Treatment for pharyngitis may also include antibiotics and corticosteroids. Inappropriate prescribing can gradually increase side effects (WHO, 2023).

Antibiotics used for pharyngitis patients include azithromycin 500 mg (78.33%), cefadroxil 500 mg (16.6%), ciprofloxacin 500 mg (1.67%), and cefixime 200 mg (1.67%) (Mahadrik *et al.*, 2021). Another study also showed that the antibiotics used in treatment therapy at the Jabung Community Health Center were amoxicillin (56.14%), cefadroxil (35.09%), and ciprofloxacin (8.77%) (Sari & Annisa, 2022).

International studies show that inappropriate antibiotic use is still widespread, especially in primary healthcare facilities, where one-third of antibiotic prescriptions are unnecessary, and some are inappropriate for indications. This leads to irrational antibiotic use and is a major cause of antimicrobial

resistance (Song *et al.*, 2025). Evaluating antibiotic use in cases of acute pharyngitis is crucial because irrational antibiotic use can have serious consequences for both patients and the healthcare system. If evaluation is not conducted, inappropriate antibiotic use, including inappropriate indications, types, and doses, can potentially increase the incidence of antibiotic resistance, reduce effectiveness, and increase the risk of side effects and healthcare costs (Rahman & Rissa, 2026).

METHODS

This study was quantitative with a descriptive design. Data were collected retrospectively from the medical records of BPJS pharyngitis patients who received Amoxicillin and Cefadroxil antibiotics at Cahaya Husada Pratama Clinic from January to December 2022. A total of 81 individuals met the inclusion criteria using a purposive sampling method. **Data Analysis:** The collected data were then recorded, grouped, and analyzed. The data were processed using Microsoft Excel and interpreted in tabular form. The results of the data analysis will be presented in descriptive and percentage tables.

RESULTS AND DISCUSSION

Characteristics of pharyngitis based on age can be seen in Table 1.

Table 1. Characteristic Age

No	Age	Frequency	Percentage (%)
1	0-5	3	3,7 %
2	6-11	4	4,9 %
3	12-16	6	7,4 %
4	17-25	24	29,7 %
5	26-35	28	34,6 %
6	36-45	16	19,7 %
Total		81	100 %

Based on data from the age characteristics at the Cahaya Husada Pratama Clinic, the 26-35 age group was more likely to suffer from pharyngitis, accounting for 28 patients (34.6%) compared to other age groups. This is because, in this study, adults experience increased outdoor activity, leading to greater exposure to air, which makes the body more susceptible to viral and bacterial infections.

Patients in early adulthood are the group most likely to experience pharyngitis. This is explained by the fact that early adulthood is a productive age group with high levels of mobility and outdoor activity, leading to increased exposure to various environmental risk factors (Nishida & Yatera, 2022). Exposure to air pollution, particularly particulate matter from motor vehicle emissions, dust, and cigarette smoke, can cause irritation and inflammation of the upper respiratory tract mucosa, increasing the risk of pharyngitis and respiratory tract infections (Glenn *et al.*, 2022).

Characteristics of pharyngitis based on gender can be seen in Table 2.

Table 2. Characteristic Gender

No	Gender	Frequency	Percentage (%)
1	Laki-laki	34	42 %
2	Perempuan	47	58 %
Total		81	100 %

Based on data from gender characteristics at Cahaya Husada Pratama Clinic, the percentage of female patients was higher at 47 (58%) compared to male patients at 34 (42%). Gender did not significantly influence the clinical pharyngitis rate, as pharyngitis can occur in both men and women. However, in this case, pharyngitis was most prevalent in women. This is because pharyngitis is caused by intrinsic factors such as hormonal factors. This study found that women are at a higher risk of developing pharyngitis due to their more unhealthy diets, such as fast food.

This is consistent with other research that suggests a link between pharyngitis symptoms and

consuming fast food, such as foods high in fat, oil, and flavorings (Mega et al., 2023). Excessive consumption of foods containing oil, flavorings such as MSG (Monosodium Glutamate), and preservatives can cause sore throat symptoms, which can lead to oral infections (Alfarisi & Damayanti, 2019).

Based on data on the therapy of antibiotics prescribed for pharyngitis patients, the following table presents:

Table 3. Therapy Antibiotic

No	Therapy Antibiotic	Dosage	Frequency	Percentage (%)
1	Amoxicillin	500 mg	46	56,8 %
2	Amoxicillin	125 mg	3	3,7 %
3	Cefadroxil	500 mg	32	39,5 %
Total			81	100 %

In this study, antibiotic prescriptions for all pharyngitis cases at Cahaya Husada Primary Clinic used only a single antibiotic. Based on the percentage data in Table 4.4, amoxicillin was the most commonly prescribed antibiotic for pharyngitis patients at Cahaya Husada Primary Clinic. The most common single antibiotic prescriptions at Cahaya Husada Primary Clinic were amoxicillin at a dose of 500 mg in 46 patients (56.8%), cefadroxil 500 mg in 32 patients (39.5%), and amoxicillin at a dose of 125 mg in 3 patients (3.7%). This study used a single antibiotic prescription because it can have benefits such as preventing the risk of drug interactions and reducing side effects.

The results of the study are supported by another study conducted at the Community Health Center in Jambi City, which found that some respondents were given amoxicillin antibiotics with a percentage of 82.35% (42 patients) compared to other antibiotics, such as Cotrimoxazole with a percentage of 17.65% (9 patients) (Dewi *et al.*, 2020). Amoxicillin is a penicillin antibiotic used to treat bacterial infections such as skin, ear, nose, and throat infections, urinary tract infections, and skin conditions. Side effects of amoxicillin include nausea, vomiting, diarrhea, rash, and itching (Gilta, 2022).

Based on data, appropriate patient, appropriate drug, and appropriate indication, the rationality of the drug can be seen in the following table:

Table 4. Appropriate Patient, Drug, And Indication

No	Drugs	Appropriate Drug Rationality	Frequency	(%)
1	Amoxicillin	Rational	47	58%
		Irrational	2	2,5%
2	Cefadroxil	Rational	31	38,3%
		Irrational	1	1,2%
No	Drugs	Appropriate Patient Rationality	Frequency	(%)
1	Amoxicillin	Rational	49	60,5%
		Irrational	0	0%
2	Cefadroxil	Rational	32	39,5%
		Irrational	0	0%
No	Drugs	Appropriate Indication Rationality	Frequency	(%)
1	Amoxicillin	Rational	47	58%
		Irrational	2	2.5%
2	Cefadroxil	Rational	31	38.3%
		Irrational	1	1.2%
Total			81	100%

Antibiotic use for pharyngitis in patients at Cahaya Husada Primary Clinic used first-line antibiotics, namely Amoxicillin and Cefadroxil, with a drug accuracy of 58% for Amoxicillin and 38.3% for Cefadroxil. Meanwhile, drug inaccuracy for Amoxicillin was 2.5% (2 patients), and for Cefadroxil, drug inaccuracy was 1.2% (1 patient). The inappropriate use of Amoxicillin and Cefadroxil can be due to the administration of antibiotics to patients with pharyngitis caused by a viral infection with symptoms of cough, runny nose, and pain when swallowing. Pharyngitis patients with symptoms caused by a viral

infection do not require antibiotics because viral infections can resolve on their own with vitamin supplements.

Based on the percentage data above, the 2023 Drug Information Handbook guidelines state that the antibiotic therapy used for pharyngitis patients with symptoms caused by viral and bacterial infections is Amoxicillin and Cefadroxil. These prescriptions are indicated for patients with otitis media, pharyngitis, sinusitis, and infections caused by susceptible organisms involving the respiratory tract.

Based on the table above, the patient-appropriate evaluation data for pharyngitis patients yielded a 100% accurate result. Accurate patient results are determined by assessing whether the antibiotics prescribed to the pharyngitis patient are contraindicated for the patient's condition. Based on the patient's medical record at the Cahaya Husada Pratama Clinic, the patient had no history of allergies or previous medical conditions related to the antibiotics prescribed. This indicates that no antibiotics were contraindicated for the patient's condition, which could exacerbate or worsen the patient's condition. Therefore, the accuracy rate is 100%, based on Dipro's (2023) literature.

This indicates that the prescription of Amoxicillin and Cefadroxil antibiotics was appropriate for the patient's condition, as the patient had no history of allergies to Amoxicillin or Cefadroxil. This study, which is considered accurate, is in accordance with Dipro's (2023) guidelines, which state that contraindications for antibiotic administration include a history of allergies, skin reactions, and hypersensitivity to antibiotics, as well as patients with kidney failure.

Similar results were obtained from a study conducted on pediatric patients diagnosed with pharyngitis, with a 100% accurate patient rate. The antibiotics given to the patient were amoxicillin and cotrimoxazole (Dewi et al., 2020). Research conducted at the Karangayu Community Health Center on patients with pharyngitis found a 100% accuracy rate. The antibiotics prescribed were amoxicillin and cefadroxil (Ovikariani et al., 2019).

The analysis of the research results in the table above shows that 47 patients (58%) used the antibiotic Amoxicillin appropriately, while 31 patients (38.3%) used the antibiotic Cefadroxil appropriately. These patients experienced fever ($>38^{\circ}\text{C}$) accompanied by a sore throat, pain when swallowing, vomiting, coughing, and a runny nose. This aligns with the symptoms of pharyngitis listed in Dipro (2023), namely sore throat, pain when swallowing, fever, vomiting (especially in children), and coughing and a runny nose.

The inappropriate indication for the use of Amoxicillin and Cefadroxil may be due to the pharyngitis patients having symptoms caused by a viral infection, such as pain when swallowing, coughing, and a runny nose. Based on medical records, some patients with pharyngitis received antibiotic therapy, but their symptoms indicated that they only had symptoms caused by a viral infection and therefore did not require antibiotics.

Antibiotics for these clinical symptoms should be given based on clear indications. Ideally, antibiotic administration should be based on microbiological examination results (Kemenkes, 2022). Not all cases of pharyngitis require antibiotic therapy. Based on patient percentage data, the appropriate indication is based on the 2023 Dipro guidelines, which state that patients with pharyngitis caused by viral and bacterial infections have symptoms of fever ($>38^{\circ}\text{C}$), sore throat, pain when swallowing, vomiting, and coughing.

Based on the appropriate regimen, the rationality of the drug can be seen in the following table:

Table 5. Appropriate Regimen					
No	Drugs	Appropriate Regimen Rationality	Frequency	(%)	Note
1	Amoxicillin	Rational	49	60,5%	

		Irrational	0	0%	Adult dose: 500 mg every 8 hours (3 times daily). Child dose: 20-50 mg/kg every 8 hours. (DIH, 2023)
2	Cefadroxil	Rational	28	34,6%	Adult dose: 500 mg twice daily Children's dose: 30 mg/kg/day divided twice daily (DIH, 2023)
		Irrational	4	4,9%	
	Total		81	100%	

Based on the table above, it can be seen that 49 patients (60.5%) used the antibiotic Amoxicillin correctly, while 28 patients (34.6%) used the antibiotic Cefadroxil correctly. Overall, the evaluation of the correct dosage was 95.1%, with the remaining 4.9% of patients not following the dosage. According to the Drug Information Handbook (2023) guidelines, adult patients are prescribed 500 mg of Amoxicillin every 8 hours, while children aged 3 months and older are prescribed 20-50 mg/kg every 8 hours. Meanwhile, the antibiotic Cefadroxil for adults is 500 mg twice daily, and for children, 30 mg/kg/day divided twice daily.

Incorrect dosing regimens for four patients are listed in Appendix 4 for the patient. These patients were given 500 mg of Cefadroxil three times daily. According to the Drug Information Handbook (2023) guidelines, antibiotic therapy for adult pharyngitis patients with Cefadroxil is 500 mg twice daily. Accurate dosing regimens are crucial in determining the appropriateness of patient treatment; if a lower dose is not optimal, healing will not be achieved, and if a higher dose can cause undesirable side effects (Lexicomp, 2023).

CONCLUSION

A comparison of antibiotic use in patients with pharyngitis found that amoxicillin can be the primary choice, while cefadroxil can be a second-line alternative. Rationality assessment was conducted by comparing the appropriate patient, appropriate drug, appropriate indication, and appropriate medication regimen to national therapeutic standards.

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