

## Antibiotic use at the ear, nose, and throat outpatient clinic in Bangli Regional Hospital, Bali

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<https://doi.org/10.22146/ijpther.20992>

### ABSTRACT

Submitted: 23-04-2025  
Accepted : 02-06-2025

**Keywords:**

antibiotic pattern;  
ear;  
nose;  
throat;  
outpatient

Ear, nose, and throat (ENT) diseases are defined as diseases that occur around the ear, nose, and throat organs, which do not recognize seasons and can affect various ages. The prevalence of ENT diseases in Indonesia is quite high, with the most common therapy being antibiotics. Irrational antibiotics use can lead to increased treatment costs, risk of side effects, and toxicity. This study aimed to evaluate the use of antibiotics among ENT outpatient. This was a cross-sectional study using medical records data from the ENT Outpatient Clinic in Bangli Regional Hospital in 2022 that meet the inclusion criteria. Data were analyzed descriptively and presented in tables or diagrams. A total of 80 samples were evaluated, predominantly aged 18-44 yo (60%), female (53.8%), and diagnosed with chronic suppurative otitis media (20%). The pattern of antibiotic prescription consisted of monotherapy antibiotics (62.5%) in solid dosage forms (58.8%), administered orally (60%), and with a duration of administration  $\geq 5$  d (82.5%). Patients aged 18-44 yr, both male and female, receiving either monotherapy or polytherapy antibiotics were predominantly cases of infection (>90%). The results of this study are expected to serve as one of the sources of information for the development of practical clinical guidelines for ENT patients receiving antibiotic therapy, particularly at the Bangli Regional Hospital, Bali.

### ABSTRAK

Penyakit telinga, hidung dan tenggorokan adalah penyakit yang mengenai daerah sekitar organ telinga, hidung dan tenggorokan, yang tidak mengenal musim dan dapat mengenai semua usia. Prevalensi penyakit telinga, hidung, dan tenggorokan di Indonesia cukup tinggi dan umumnya diterapi dengan antibiotik. Penggunaan antibiotik yang tidak rasional dapat menyebabkan peningkatan biaya pengobatan, risiko efek samping, dan efek toksik. Penelitian ini bertujuan untuk mengkaji penggunaan antibiotik pada pasien rawat jalan akibat penyakit telinga, hidung, dan tenggorokan. Penelitian dengan rancangan potong lintang ini menggunakan data berupa rekam medis pasien rawat jalan di Poliklinik THT RSUD Bangli tahun 2022 yang memenuhi kriteria inklusi. Data dianalisis secara deskriptif dan disajikan dalam tabel atau diagram. Total 80 sampel dianalisis, yang didominasi usia 18-44 tahun (60%), berjenis kelamin perempuan (53,8%), dan diagnosis Otitis Media Suppuratif Kronik (20%). Pola peresepan antibiotik terdiri dari antibiotik monoterapi (62,5%) dengan bentuk sediaan solid (58,8%), rute pemberian oral (60%), serta durasi pemberian  $\geq 5$  hari (82,5%). Pasien yang berusia 18-44 tahun, baik laki-laki maupun perempuan dengan pemberian antibiotik monoterapi ataupun politerapi didominasi kasus infeksi (>90%). Hasil penelitian ini diharapkan dapat menjadi salah satu sumber informasi untuk pengembangan panduan praktis klinik pasien THT yang menerima terapi antibiotik khususnya di RSUD Bangli, Bali.

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## INTRODUCTION

Ear, nose, and throat (ENT) diseases are defined as diseases that occur around the ear, nose, and throat organs, which do not recognize seasons and can affect various ages.<sup>1</sup> ENT diseases are often considered non-serious by some members of the community, leading to inadequate treatment and resulting in previous conditions worsening or causing other diseases. The factors that cause ENT diseases consist of two types, namely congenital and acquired. Congenital diseases manifest at birth, while acquired diseases arise through infection, trauma, neoplasia (malignancy/tumor), or allergy.<sup>2</sup>

The Ministry of Health reported the number of patients suffering from ENT diseases in Indonesia reached 35 million people or 16.8% of the total population or for every 1000 residents, 190-230 of them suffer from ENT diseases. This number continues to increase in line with the rising number of patient visits to the ENT outpatient clinics in Indonesia, which has seen an annual increase of approximately 80,000 visits.<sup>3</sup> Suprayitno *et al.*,<sup>4</sup> reported that infections dominated the most cases at the ENT Polyclinic of Ragab Begawe Caram Mesuji Regional Hospital, Lampung, Indonesia in 2020, with a percentage of 62%. Most diseases in the ENT area are belong to infectious diseases that are usually treated with antibiotics. However, in Indonesia irrational use of antibiotics is relatively high. It was reported 40-62% of antibiotics use was improperly and 30-80% was inappropriately. It can lead to health problems in the community, especially related to bacterial resistance.<sup>5</sup> The number of cases caused by antibiotic resistance continues to increase, with 34,500 deaths directly attributable to antibiotic resistance and 133,800 deaths associated with antibiotic resistance in Indonesia at 2019.<sup>6</sup>

Alasyam *et al.*,<sup>7</sup> revealed that the most common infectious diseases in the ear are otitis externa (6.04%), in the nose are sinusitis (13.70%), and in the throat are tonsillitis (12.98%). However, this study also mentioned the administration of antibiotics for diseases that are not bacterial infections, some of which include epistaxis and aural polyps. Furthermore, Arora *et al.*,<sup>8</sup> reported in outpatient and inpatient patients at RAMA Medical College, India there are several non-infectious diseases that also receive antibiotic therapy, such as traumatic tympanic membrane perforation, epistaxis, and nasal bone fractures.<sup>8</sup> A retrospective study conducted in France mentioned that improper use of antibiotic such as absence or lack of indication mostly comes from ENT disease (82.26%). This certainly needs attention because the administration of antibiotics without indication can lead to antibiotic resistance. In addition, the irrational use of antibiotics can also lead to several issues, such as the risk of side effects, drug toxicity, and increased treatment costs.<sup>9</sup> Supporting this concern, a study conducted at Dr. Soetomo General Hospital in Surabaya reported that 90% of *Pseudomonas aeruginosa* isolates obtained from the ear discharge of patients with chronic suppurative otitis media (CSOM) between 2019 and 2020 were resistant to amoxicillin-clavulanic acid, cefazolin, ceftriaxone, cotrimoxazole, and tetracycline.<sup>10</sup> This highlights the real impact of inappropriate antibiotic use and the urgent need for more rational prescribing practices, especially in ENT-related infections.

This study aimed to investigate patient characteristics and antibiotic prescription patterns at the Bangli Regional Hospital Bangli, Bali. This research is essential, considering that similar studies have never been conducted at the Bangli Regional

Hospital, Bali. Moreover, Bangli Regency is one of the areas in Bali Province characterized by highlands and low temperatures, which are known as risk factors contributing to high morbidity rate of ENT diseases.<sup>11</sup> We expect to use the research results to evaluate the use of antibiotic in Bangli Regional Hospital.

## MATERIAL AND METHODS

### Design and sample of study

This study used medical record data and approved by the Health Research Ethics Committee of Bangli Regional Hospital with letter number 400.7.22.2/1051/RSUD. The methodology used in this study was a descriptive observational method with a cross-sectional design. The medical record data of patients receiving antibiotic therapy at the ENT Outpatient Clinic of Bangli Regional Hospital were collected for the period of January-December 2022.

### Data collection

The data obtained includes gender, age, diagnosis, and antibiotic pattern (type, quantity, form of preparation, route of administration, and duration). All samples met the inclusion criteria, namely patients receiving antibiotic therapy prescribed by doctors at the ENT Outpatient Clinic of Regional Hospital Bangli and patients who are at least 18 yo. The exclusion criteria for the sample are patients who are hospitalized through the ENT Outpatient Clinic and patients whose medical records are incomplete (not containing all the data required for the study: age, gender, diagnosis, as well as the type, quantity, and form of antibiotic preparation). The sampling in this study used the consecutive sampling technique. The sample size was set at 80 samples based on the sample size formula for cross-sectional studies with a research population of 467.

### Data analysis

Data analysis was conducted after the procedure of verifying the accuracy and completeness of the data. The data is then coded, tabulated, and entered into the computer system. Univariate analysis was conducted to examine the characteristics of the sample, such as age, gender, diagnosis, and antibiotic characteristics, including type, quantity, dosage form, route of administration, and duration of antibiotic administration. The analysis was then continued by performing a crosstabulation between the disease diagnosis variable and the patients' demographic characteristics and the amount of antibiotics.

## RESULTS

Based on the sample size calculation, this study included a total of 80 patients selected through consecutive sampling. During the data collection process, 4 samples were excluded because they were under 18 yo. The sample flowchart is illustrated in FIGURE 1. The distribution of the sample characteristics, including age and gender as described in TABLE 1. Female patients, aged between 18 and 44 yr, made up the majority of the samples (53.8%). The average age of the sample was  $39.26 \pm 18.11$  yr.

Based on FIGURE 2, the diagnosis of ENT diseases is classified according to the organ, including diagnoses of the ear, nose, and throat, and a combination if it consists of 2 diagnoses. This study found 44 ear diagnoses (55%), all caused by infections. Diagnosis on the nose found 8 samples caused by infection (10%) and 4 samples caused by non-infection (5%). Diagnosis on the throat: there were 11 samples diagnosed with infection (13.8%) and 1 sample diagnosed with non-infection (1.3%). In this study, there are 12 combined diagnoses, all of which fall under the infection etiology (15%).

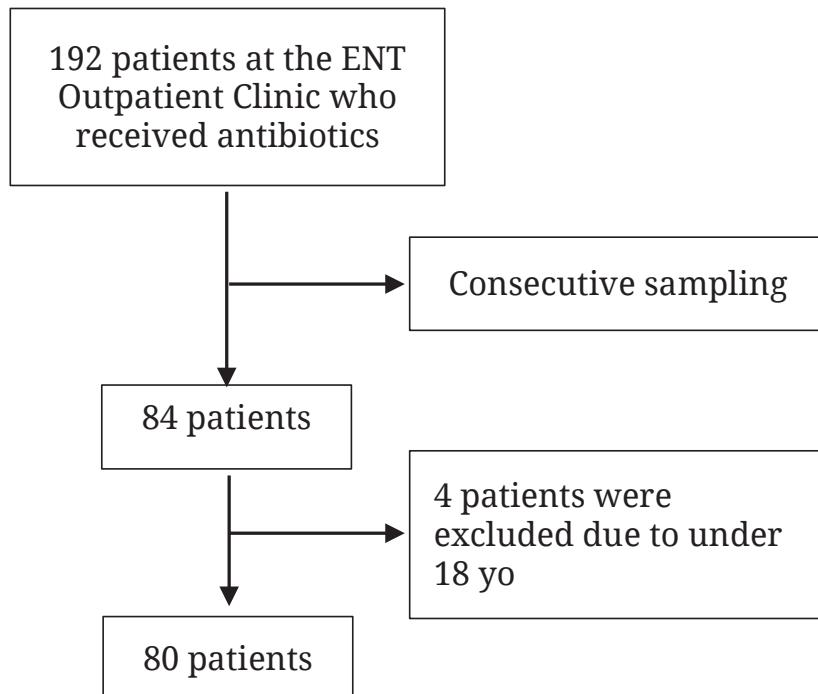


FIGURE 1. Sample flowchart

TABLE 1. Characteristic of research samples (total n=80)

Variable	n (%)	Mean $\pm$ SD
Age (yo)	-	39.26 $\pm$ 18.10
• 18-44	48 (60.0)	-
• 45-59	20 (25.0)	-
• $\geq$ 60	12 (15.0)	-
Gender		
• Male	37 (46.3)	-
• Female	43 (53.8)	-

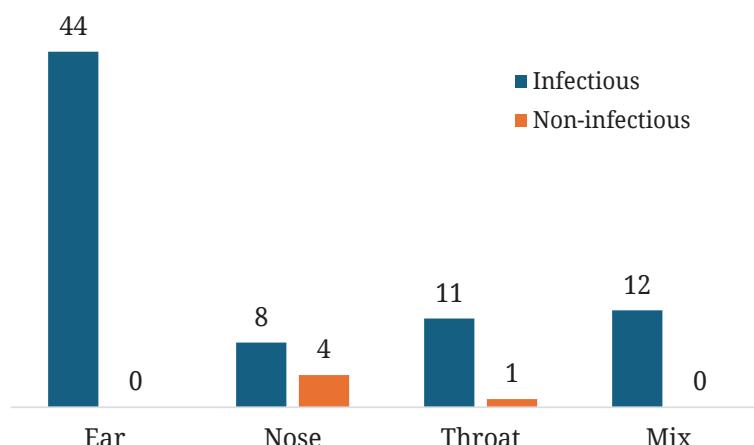


FIGURE 2. Characteristic of disease diagnosis

TABLE 2 contains details regarding the disease diagnosis data in this study. The most common ear disease diagnosis is chronic suppurative otitis media (CSOM), with 16 cases (20%). The most common nasal disease is epistaxis, which is a non-infectious disease with 4 cases (5%). The most common throat disease

diagnosis is acute laryngitis, with 4 cases (5%). In addition, there are combination diseases with more than one diagnosis, such as the most common cases, which are the combination of otitis externa with cerumen obstruction (2.5%) and CSOM (2.5%).

TABLE 2. Characteristic of disease diagnosis

Diagnosis	Infection n (%)	Non infention n (%)
<b>Ear diagnosis</b>		
• CSOM	16 (20.0)	-
• OE	15 (18.75)	-
• AOM	9 (11.25)	-
• OME	3 (3.75)	-
• CO	1 (1.25)	-
<b>Nasal diagnosis</b>		
• Epistaxis	-	4 (5.0)
• AR	2 (2.5)	-
• Sinusitis	1 (1.25)	-
• MS	2 (2.5)	-
• Rhinosinusitis	1 (1.25)	-
• MR	2 (2.5)	-
<b>Throat diagnosis</b>		
• AL	4 (5.0)	-
• AT	3 (3.75)	-
• AP	1 (1.25)	-
• ATP	3 (3.75)	-
• AH	-	1 (1.25)
<b>Mix</b>		
• OE + SO	2 (2.5)	-
• OE + CSOM	2 (2.5)	-
• OE + Otomycosis	1 (1.25)	-
• OE + OME	1 (1.25)	-
• OE + AP	1 (1.25)	-
• CSOM + MS	1 (1.25)	-
• CT + AlR	1 (1.25)	-
• Epistaxis + AR	1 (1.25)	-
• Epistaxis + MS	1 (1.25)	-
• ATP + OC	1 (1.25)	-
<b>Total</b>	<b>75 (93.75)</b>	<b>5 (6.25)</b>

Note: CSOM=chronic suppurative otitis media; OE=otitis externa; AOM=acute otitis media; OME=otitis media effusion; CO=circumscribed otitis; AR=acute rhinitis; MS=maxillary sinusitis; MR=maxillary rhinosinusitis; AL=acute laryngitis; AT=acute tonsillitis; AP=acute pharyngitis; ATP=acute tonsillopharyngitis; AH=adenoid hyperthropy; SO=serumen obstruction; CT=catarrhal tube; AlR=allergic rhinitis; OC=oral candidiasis

The patterns of antibiotic prescriptions observed in this study, as detailed in TABLES 3 and 4, include the quantity, dosage form, route of administration, duration of administration, and type of antibiotic. TABLE 3 shows that the most prescribed number of antibiotics in each prescription was monotherapy (62.5%), with an average number of antibiotics given being  $1.37 \pm 0.48$ . The form of antibiotic preparations that are most frequently prescribed was solid (58.8%). The combination dosage forms in this study include solid and liquid forms (37.5%). The route of antibiotic administration was most commonly oral (60%), with the most frequent combination route being oral and topical (36.3%). Most of the prescribed antibiotics had a duration of administration of more than 5 d (82.5%), with an average duration of administration of  $5.48 \pm 1.31$  d. Based on the data in TABLE 4, it was found that the most prescribed type of antibiotic for monotherapy was  $\beta$ -lactam (40%), followed by fluoroquinolones (11.3%) and macrolides (8.3%). Also, polytherapy antibiotics were given, with the most common combinations being  $\beta$ -lactam with aminoglycosides (17.5%), and fluoroquinolones with aminoglycosides

(10%).

Cross-tabulation in this study was conducted to observe the trends in disease diagnosis among patients receiving antibiotics at the Bangli Regional Hospital in 2022 based on the characteristics of age and gender of the patients as well as the number of antibiotics prescribed in each prescription (TABLE 5). Patients receiving antibiotics in the ENT outpatient clinic aged 18-44 yr were predominantly cases of infection (93.8%), as well as in the age category of 45-59 yr (90%) and  $\geq 60$  yr (100%). This was different from non-infectious diagnoses, where in the age category of 18-44 yr, only 3 cases (6.3%) of non-infectious diseases were found, 2 cases in the age range of 45-59 yr (10%), and no cases at all in the age group of  $\geq 60$  yr. Patients receiving antibiotics at the ENT Outpatient Clinic, both male and female, mostly have a diagnosis of infectious diseases (>90%). The administration of antibiotic therapy for patients in the ENT Outpatient Clinic, whether monotherapy or polytherapy, is dominated by patients with an infection diagnosis. We found none of non-infectious diagnosis in any patients receiving polytherapy antibiotics.

TABLE 3. Characteristic of antibiotic utilization (total n=80)

Variable	n (%)	Mean $\pm$ SD
Amount of antibiotic	-	$1.37 \pm 0.48$
• Monotherapy	50 (62.5)	-
• Politherapy	30 (37.5)	-
Antibiotic dosage form		
• Solid	47 (58.8)	-
• Semisolid	0 (0.0)	-
• Liquid	3 (3.8)	-
• Combination	30 (37.5)	-
Antibiotic route		
• Oral	48 (60.0)	-
• Topical	3 (3.8)	-
• Parenteral	0 (0.0)	-
• Intranasal	0 (0.0)	-
• Inhalation	0 (0.0)	-
• Combination	29 (36.3)	-
Antibiotic duration (d)	-	$5.48 \pm 1.31$
• $< 5$	14 (17.5)	17.5
• $\geq 5$	66 (82.5)	82.5

TABLE 4. Antibiotic types (total n = 80)

Variable	n (%)
Monotherapy	
• β-lactam	32 (40.0)
• Fluoroquinolone	9 (11.3)
• Macrolide	7 (8.8)
• Aminoglycoside	1 (1.3)
• Chloramphenicol	1 (1.3)
Polytherapy	
• β-lactam + aminoglycoside	14 (17.5)
• β-lactam + chloramphenicol	1 (1.3)
• β-lactam + fluoroquinolone	1 (1.3)
• Fluoroquinolone + aminoglycoside	8 (10.0)
• Fluoroquinolone + chloramphenicol	3 (3.8)
• Macrolide + aminoglycoside	2 (2.5)
• Fluoroquinolone + quinolone	1 (1.3)

TABLE 5. Cross-tabulation between characteristic of sample, amount of antibiotic, and disease of diagnosis

Variable	Infection [n (%)]	Non infection [n (%)]	Total [n (%)]
Age (yo)			
• 18-44	45 (93.8)	3 (6.3)	48 (100.0)
• 45-59	18 (90.0)	2 (10.0)	20 (100.0)
• ≥ 60	12 (100.0)	0 (0.0)	12 (100.0)
Gender			
• Male	34 (91.9)	3 (8.1)	37 (100.0)
• Female	41 (95.3)	2 (4.7)	43 (100.0)
Amount of antibiotic			
• Monotherapy	45 (90.0)	5 (10.0)	50 (100.0)
• Polytherapy	30 (100.0)	0 (0.0)	30 (100.0)

## DISCUSSION

### Characteristic of samples

This study found that the majority of the samples were patients aged 18–44 years (60%) and females (53.8%). Previous research conducted by Giri *et al.*<sup>12</sup> also showed that the majority of their research sample consisted of ENT patients receiving antibiotic therapy from the age group of 20-40 yr (61.04%). Similar to the research conducted by Pallavi *et al.*<sup>13</sup>, it was found that patients at the ENT outpatient clinic were predominantly aged 23-42 yr (69.92%). This is associated with the adult age

group, which has a higher level of mobility and easier access to healthcare facilities.<sup>13</sup>

The majority of the samples in this study were female (53.8%). These results are consistent with the study conducted by Sajjad *et al.*<sup>14</sup> which also indicated that the majority of ENT patients examined at Shalamar Hospital were female, with a total 571 out of 862 patients (66.2%). Different results were obtained through research by Srinivasa *et al.*<sup>15</sup> in which the sample was dominated by men (64%). The high rate of antibiotic prescriptions among male patients is due to exposure to pollution and pathogens in the external environment,

considering the higher number of male workers compared to females. The high rate of antibiotic prescriptions among females, as observed in this study, may also be attributed to their more frequent exposure to cooking smoke in the kitchen compared to males, making them also susceptible to ENT problems.<sup>15</sup>

### Characteristic of disease diagnosis

This study also found that the majority of the samples receiving antibiotic therapy were diagnosed with infectious diseases (90%) and a small portion with non-infectious diseases (10%). Infectious diseases were dominated by CSOM (23.8%) and OE (22.5%). Chronic suppurative otitis media is an inflammation of the middle ear lining that can affect part or all of it, causing a hole in the eardrum and ongoing or repeated discharge of pus or thick mucus for over 2 mo.<sup>16,17</sup> Otitis externa is an acute or chronic inflammation of the ear canal that also involves the tympanic membrane.<sup>18</sup> The high number of CSOM patients is also associated with the majority age of the sample in this study, which is 18-44 yo. Some CSOM patients have a history of ear discharge (otorrhea) since childhood that was not adequately treated, so their condition in adulthood is a continuation of the complaints they suffered from in childhood. In addition, the high incidence of CSOM in adults is also caused by exposure to infections from the environment, poor hygiene, and a history of chronic infections that have not been adequately treated.<sup>16</sup> Several factors associated with the high incidence of OE in adulthood include high outdoor activities at this age, which can lead to exposure to excessive heat, low humidity, and severe dust. However, there is no research proving a relationship between CSOM and OE with the gender of the sample.<sup>16,18</sup>

In addition to infectious diseases,

there are also non-infectious diseases that received antibiotic therapy in this study, including epistaxis (5%) and adenoid hypertrophy (1.25%). This data is similar to the findings of the study by Isaac *et al.*,<sup>19</sup> which indicated that in their research, epistaxis received antibiotic therapy, namely cefuroxime. Epistaxis dominates non-infectious diseases in this study and is an acute bleeding originating from the nostrils, nasal cavity, or nasopharynx. Open blood vessels due to bleeding can trigger infections, necessitating the administration of antibiotics. Furthermore, the placement of tampons in epistaxis can also trigger the occurrence of rhinosinusitis, septicaemia, otitis media, or toxic shock syndrome, which is also a consideration that every tampon placement requires the administration of prophylactic antibiotics.<sup>20</sup>

This study also found adenoid hypertrophy, which is a non-physiological enlargement of the adenoid glands. The etiology of adenoid hypertrophy has not yet been clearly proven, but it is suspected to be caused by physiological factors, inflammation, and malignancy processes. Inflammatory factors of adenoids can occur due to recurrent upper respiratory tract infections, irritation from cigarette smoke, immune system disorders, laryngopharyngeal reflux, and, most commonly, allergies.<sup>21,22</sup> Management of adenoid inflammation can be either medicinal or surgical. The pharmacological management involves the administration of corticosteroids, antibiotics, proton pump inhibitors (PPIs), and antihistamines. Karataş *et al.*,<sup>23</sup> reported that appropriate antibiotic treatment for adenoid gland hypertrophy will yield beneficial results, especially for the normal adenoid flora, thereby preventing colonization by pathogens. If the pharmacological therapy does not yield optimal results, an adenoidectomy will be performed.<sup>21</sup>

## Characteristic of antibiotic

In this study, the majority of patients were prescribed monotherapy antibiotics (62.5%), predominantly of the  $\beta$ -lactam type (40%). This result is similar to the study conducted by Aalasyam *et al.*<sup>7</sup> which found that the highest use of monotherapy antibiotics was  $\beta$ -lactam during the period from July 2019 to February 2020. The high prescription rate of  $\beta$ -lactam antibiotics can be attributed to their broad-spectrum efficacy against both gram-positive and gram-negative bacteria. Furthermore,  $\beta$ -lactam antibiotics are regarded as the appropriate initial treatment for acute infections, particularly acute rhinosinusitis.<sup>8</sup> This study also found polytherapy prescriptions dominated by the combination of  $\beta$ -lactam and aminoglycoside antibiotics (17.5%). The combination of aminoglycosides and  $\beta$ -lactam antibiotics is commonly employed in the empirical treatment of sepsis and other severe infections due to its synergistic antibacterial effects, which help broaden the antimicrobial spectrum, accelerate bacterial clearance, and reduce the risk of antibiotic resistance. Pharmacodynamically, this synergy results from the complementary mechanisms of action:  $\beta$ -lactams inhibit bacterial cell wall synthesis, facilitating the entry of aminoglycosides, which then disrupt protein synthesis.  $\beta$ -lactams exhibit time-dependent killing, whereas aminoglycosides are concentration-dependent with a significant post-antibiotic effect, making the combination particularly effective in rapidly reducing bacterial load. From a pharmacokinetic perspective, the two antibiotics differ in tissue distribution and administration profiles.  $\beta$ -lactams are widely distributed and often require frequent dosing or continuous infusion, while aminoglycosides have limited tissue penetration but are typically administered once daily to

optimize peak concentrations and minimize nephrotoxicity. Clinically, this combination is not only effective against a broad range of gram-positive and gram-negative pathogens, but also offers advantages in terms of chemical stability and cost-effectiveness. However, careful consideration must be given to potential nephrotoxicity and to avoiding inactivation of the drugs when co-administered intravenously, necessitating appropriate dosing intervals and routes of administration.<sup>24</sup>

The number of antibiotics given in each prescription is essential to assess the rationality of that prescription. In this study, the average number of antibiotic prescriptions was  $1.37 \pm 0.48$ , which is in accordance with the WHO recommendation of less than 3 types of antibiotics in each prescription.<sup>25</sup> This average is lower compared to the results of the study by Aalasyam *et al.*,<sup>7</sup> which reported an average antibiotic prescription rate of 3.18, indicating the presence of polypharmacy. This results in high drug interactions, an increased risk of adverse drug reactions, drug resistance, and an increase in unnecessary treatment costs. Based on this study, there was also no administration of polytherapy antibiotics to elderly patients. The number of antibiotic prescriptions for the elderly requires more attention because the declining bodily functions of the elderly as they age will also result in a decrease in their pharmacokinetic and pharmacodynamic functions. As they age, the elderly have lower body mass with more fat compared to their younger years, and some fat-soluble drugs have an increased volume of distribution, resulting in a relatively prolonged clearance rate in older adults. Additionally, the elimination of drugs that occurs through the kidneys will decrease due to the declining kidney function with age.<sup>26</sup>

Solid preparations dominated the

antibiotic preparation form in this study (58.8%), followed by a combination of solid and liquid preparations (37.5%). This conclusion is consistent with the research findings by Srinivasa *et al.*,<sup>15</sup> which indicated that most prescribed antibiotic preparations are in solid form, namely tablets (46.2%) and capsules (28.6%). This finding can also be linked to the predominant disease observed in this study, particularly ear disease. In the treatment of ear infections, antibiotics are commonly administered not only in solid dosage forms but also in liquid formulations, such as ear drops, which allow for localized drug delivery and enhanced therapeutic effectiveness. In line with the form of the preparation, the administration route in this study was dominated by the oral route (60%) with a combination of oral and topical routes (36.3%). Several research findings also mention similar results, such as the study by Giri *et al.*<sup>12</sup> where the route of antibiotic administration for ENT patients was mostly oral (74%). The route of antibiotic administration through the parenteral route was not found in this study because the sample used only included outpatient patients, whereas the parenteral route is usually given to inpatient individuals, as indicated in the study by Isaac *et al.*,<sup>19</sup> where the majority of inpatient patients received antibiotics through the parenteral route (69%), while the majority of outpatient patients received therapy through the oral route (90%).<sup>19</sup> Moreover, the absence of the use of antibiotics through the parenteral route for outpatient patients also indicates the doctors' good awareness of the side effects that can arise from excessive injection use.<sup>27</sup>

Most of the samples in this study received antibiotic therapy with a duration of use  $\geq 5$  d (62.5%) with an average use of 5.48 days. Furthermore, the research by Aalasyam *et al.*,<sup>7</sup> also presented similar results, with the majority of antibiotics used in their

study having a duration of 3-5 d (70.3%). According to the guidelines of The American Academy of Otolaryngology, the use of antibiotics in adult patients is recommended for a duration of 5-10 d with an evaluation of patient improvement on the 7<sup>th</sup> day. In this study, no use of antibiotics for more than 10 d was found. The duration of antibiotic use should be extended to more than 10 d if the patient does not show improvement after a 5-day usage period or if the patient needs to be hospitalized due to a more severe illness, such as pneumonia, which requires antibiotic therapy for up to 21 d.<sup>28</sup>

#### **Cross-tabulation between characteristic of sample, amount of antibiotic, and disease of diagnosis**

In this study, antibiotic recipients at the ENT outpatient clinic aged 18–44 yr were predominantly cases of infection (45 cases), as were those in the age categories of 45–59 yr (18 cases) and  $\geq 60$  yr (12 cases). In a previous study conducted by Imama & Susilowati<sup>29</sup>, similar results were obtained, showing that the antibiotics prescribed were predominantly for patients in the adult age range (26–35 yr), which is a productive age group. Due to the high intensity of work or daily activities, this group is potentially at risk of decreased immune resistance, which can affect the production of hormones, enzymes, and substances necessary for the immune process, making them more susceptible to infections that require antibiotic therapy.<sup>29</sup> The administration of antibiotics for individuals aged  $\geq 60$  yr (elderly) requires more attention due to physiological changes in the body that can affect the pharmacokinetics and pharmacodynamics of the drug. Based on previous research, there is a frequency of unnecessary antibiotic prescriptions in outpatient clinics for patients aged  $\geq 65$  yr with respiratory

infections, acute bronchitis, sinusitis, and non-suppurative otitis media.<sup>30</sup> However, in this study, the frequency of antibiotic administration in elderly patients with an infection diagnosis was quite low (12 cases). Furthermore, we found no prescriptions for antibiotics for elderly patients with non-infectious diagnoses. In general, the prescription of antibiotics for non-infectious disease diagnoses across all age categories is quite minimal compared to the diagnosis of infectious diseases. This variation may be due to the smaller number of samples with non-infectious diagnoses in this study compared to infectious diseases.

In this study, it was found that female patients dominated the use of antibiotic therapy due to the presence of infectious diseases (41 cases). The relationship between the patient's gender and the receipt of antibiotics has not yet been clearly described, but in a study conducted by Sari *et al.*<sup>31</sup> it was mentioned that women (53.76%) often suffer from infectious diseases and need to receive antibiotic therapy compared to men (46.34%). This is because women are considered to be more alert, responsive, agile, and have greater sensitivity, concern, and attention to their own health and that of their families. Additionally, women are also considered to have high levels of outdoor activity, making them more susceptible to air pollution from cigarette smoke and the use of biomass for cooking.<sup>31</sup> Research by Pradina & Hanifa<sup>32</sup> also revealed similar findings, showing that women (60%) are more likely to suffer from infectious diseases due to biological differences, anatomical structures, and hormonal changes in women that contribute to the onset of diseases. Additionally, there are psychological factors where women's stress levels are higher compared to men, which affects both physical and mental health, thereby increasing susceptibility to infectious diseases.

The results of this study show the

prescription of monotherapy antibiotics (45 cases) and polytherapy (30 cases) that are predominantly prescribed for infectious diseases. Based on the research results by Sigdel *et al.*,<sup>33</sup> it was found that the average prescription of antibiotic types was 3.5, which is higher than the WHO recommendation (<3 drugs/prescription). This indicates the presence of polypharmacy that needs to be evaluated to reduce adverse drug reactions, side effects, and increased treatment costs. Therefore, the use of monotherapy antibiotics is more often chosen due to several advantages such as lower risk of drug interactions, better adherence, and lower risk of medication errors.<sup>34,35</sup> The results of this study show a very low frequency of receiving monotherapy antibiotics for non-infectious diagnoses (10%) and no polytherapy antibiotics were given to patients with non-infectious diagnoses. This is considered quite rational, although the Bangli Regional Hospital does not have specific protocols regulating antibiotic prescriptions, the antibiotic prescriptions at the hospital still refer to guidelines in accordance with the regulations of the Ministry of Health of the Republic of Indonesia.

Based on the findings of this study, a clinical recommendation would be to promote the rational use of antibiotics in accordance with infection specific indications, particularly in ENT outpatient settings. Given that the majority of antibiotic prescriptions were appropriately targeted for infectious cases, and that no polytherapy antibiotic was administered for non-infectious diagnoses, this reflects a generally prudent prescribing practice. However, continued efforts should be made to reinforce antibiotic stewardship, especially in ensuring accurate diagnosis and avoiding unnecessary antibiotic use for non-infectious conditions. Clinicians should also be encouraged to adhere to evidence-based guidelines, including

appropriate dosage forms, routes of administration, and duration of therapy to optimize treatment outcomes and minimize the risk of antibiotic resistance.

### Limitation of the study

This study has several limitations. First, the study uses a cross-sectional approach, so in this research, the cause-and-effect relationship between the involved variables cannot be observed. Second, because this study employs the consecutive sampling method, the sample selection process is not random and may not accurately reflect the entire population. Third, this study was conducted at only one healthcare facility, so the variation in patient characteristics and the patterns of antibiotic prescriptions obtained are limited. Fourth, due to limitations in available medical record data, particularly regarding clinical variables such as disease severity, underlying causes, and patient outcomes, we were unable to perform a more comprehensive multivariable analysis. Future studies with more complete clinical documentation and broader sampling are recommended to enable more robust statistical modeling and strengthen generalizability.

### CONCLUSION

In conclusion, patients at the ENT Outpatient Clinic of Bangsil Regional Hospital, Bali who received antibiotics were predominantly aged 18–44 yr, female, and diagnosed with CSOM. The majority of antibiotics were prescribed as monotherapy, in solid dosage forms, administered orally, and given for a duration of  $\geq 5$  d. Among patients aged 18–44 yr, both male and female, antibiotic prescriptions—whether as monotherapy or polytherapy—were largely associated with infectious cases. The most frequently prescribed antibiotic in monotherapy was from the  $\beta$ -lactam group, whereas

the most common polytherapy regimen involved a combination of  $\beta$ -lactam and aminoglycoside.

These findings underline the need for ongoing evaluation of prescribing patterns to ensure antibiotics are used appropriately, particularly in ENT cases where non-bacterial diagnoses are also common. Strengthening antimicrobial stewardship and adhering to clinical guidelines for rational antibiotic use are essential to prevent resistance, reduce unnecessary exposure, and improve patient outcomes in routine ENT practice.

### ACKNOWLEDGMENT

We would like to thank the Bangli Regional Hospital, Bali for their collaboration and support during the data collection.

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