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ORIGINAL ARTICLE

Antibiotic consumption among university students

Consumo de antibióticos entre estudantes de graduação

Consumo de antibióticos entre estudiantes universitarios

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Abstract

Objective: to describe the consumption of antibiotics among undergraduate students in Coari - Amazonas. **Method:** cross-sectional study of non-probabilistic sampling by quota. Data collection took place between March and Jul 2018. 694 students (70%) from the educational institution took part in the study. The study was approved by the Research Ethics Committee. **Results:** among the participants, 15.3% consumed antibiotics, half practiced self-medication with the use of antibiotics (50.0%). Students from non-health courses were the ones who practiced self-medication with antibiotics the most (65.4%). The most consumed substance was amoxicillin (44,7%) and the main reason for taking antibiotics was tonsillitis (39.0%). **Conclusions:** the prevalence of self-medication among students was high, and considering the risks associated with the improper use of antibiotics, it is important to implement measures to encourage the rational use of antibiotics in universities.

Descriptors: Anti-Bacterial Agents; Students; Drug Resistance, Bacterial.

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Resumo

Objetivo: descrever o consumo de antibióticos entre estudantes de graduação de Coari - Amazonas**. Método:** estudo transversal de amostragem não-probabilística por cota. A coleta de dados ocorreu entre março à julho de 2018. Participaram do estudo 694 estudantes (70%) da instituição de ensino. O estudo foi aprovado por Comitê de Ética em Pesquisa. **Resultados:** entre os participantes, 15,3% consumiram antibióticos, a metade praticou a automedicação com o uso de antibióticos (50,0%). Os estudantes dos cursos que não eram da área da saúde foram os que mais praticaram automedicação com antibióticos (65,4%). A substância mais consumida foi a amoxicilina (44,7%) e o principal motivo que levou ao consumo de antibióticos foi à amigdalite (39,0%). **Conclusões:** a prevalência da automedicação entre estudantes foi elevada, considerando os riscos associados ao uso indevido de antibióticos, é importante implementar medidas que incentivem o uso racional de antibióticos nas universidades.

Descritores: Antibacterianos; Estudantes; Farmacorresistência Bacteriana.

Resumen

Objetivo: describir el consumo de antibióticos entre estudiantes universitarios de Coari - Amazonas. **Método:** estudio transversal de muestreo no probabilístico por cuotas. La recolección de datos se realizó entre marzo y julio de 2018. Participaron en el estudio 694 estudiantes (70%) de la institución educativa. El estudio fue aprobado por el Comité de Ética de la Investigación. **Resultados:** entre los participantes, el 15,3% consumía antibióticos, y la mitad de ellos practicaba la automedicación con el uso de antibióticos (50,0%). Los estudiantes de cursos no sanitarios fueron los que más practicaron la automedicación con antibióticos (65,4%). La sustancia más consumida fue la amoxicilina (44,7%) y el principal motivo para tomar antibióticos fue la amigdalitis (39,0%). **Conclusiones:** La prevalencia de automedicación entre los estudiantes fue elevada y, teniendo en cuenta los riesgos asociados al uso inadecuado de antibióticos, es importante implementar medidas para fomentar el uso racional de antibióticos en las universidades.

Descriptores: Antibacterianos; Estudiantes; Farmacorresistencia Bacteriana.

INTRODUCTION

Infectious diseases were once one of the major health problems facing humanity, responsible for high rates of morbidity and mortality. However, since their discovery, antibiotics have revolutionized the treatment of infectious diseases caused by bacteria and contributed to reducing the morbidity and mortality rates associated with such conditions worldwide.[1]

Antibiotics can inhibit and/or eliminate bacteria that cause infections, so it is important to understand the infectious agent to choose the appropriate treatment. Since their discovery, antibiotics have been consumed excessively and inappropriately, leading to the emergence of bacterial resistance. This has limited therapeutic options for bacterial infections, creating a public health concern.[2,3]

In this sense, several studies have sought to understand the magnitude of antibiotic consumption in different populations, including university students. Rates of antibiotic self-medication among

undergraduate students in international studies range from 10.2% to 67.7%.[4–14]

A study conducted in India indicated a 67.7% prevalence of self-medication with antibiotics. The main complaints indicated for consumption were fever (47.5%), followed by respiratory infections (39.3%) and gastrointestinal problems (35.2%). The most commonly used medications were extended-release penicillins (60.6%).[10] In Nepal, the prevalence of self-medication with antibiotics was 51.1%. The most commonly used medications were azithromycin (28.1%) and amoxicillin (17.2%). The main health reason reported was sore throat with runny nose (45.3%), followed by fever (31.6%).[8]

Among Tanzanian students, the prevalence was 57%, with amoxicillin (32.0%) as the most consumed medication and headaches (31.0%) as the main health problem.[4] In Sudan, the prevalence was 60.8% among university students, with antibiotics consumed mainly for respiratory tract infections (38.1%) and coughs (30.4%).[5]

In Ghana, the prevalence of non-prescription antibiotic use was 56%, with amoxicillin being the most commonly used antibiotic (72.4%) and skin wound symptoms (64%) being the most prevalent.[12] A study of students in Rwanda found a 12.1% prevalence of self-medication. The most commonly used antibiotics were amoxicillin (59.4%) and tetracycline (2.9%). The main health reasons cited were the common cold/fever/cough (47.8%) and sore throat (14.4%).[13]

In Brazil, studies on antibiotic use among university students are still incipient. Self-medication in this group ranged from 9.0% to 58.87%. In the northern region of the country, in Pará, the prevalence of antibiotic self-medication was 9.0%.[15]

In Paraná, the prevalence of non-prescription antibiotic use was 26%. The main health problem reported as a reason for this practice was upper respiratory tract infections (51.3%) with amoxicillin being the most commonly used antibiotic class (28.9%).

Despite the implementation of Resolution RDC No. 44 of October 26, 2010, by ANVISA in Brazil, which regulates the dispensing of antimicrobials that should only be sold with a specially controlled prescription, self-medication with these products among university students remains common. However, in less affluent regions far from capital cities, the extent of antibiotic consumption is unknown.

Therefore, the study sought to describe the consumption of antibiotics among undergraduate students in Coari - Amazonas.

METHOD

This study is part of a larger study entitled "Self-medication among undergraduate students in the interior of Amazonas." It is a descriptive, cross-sectional study conducted between March and July 2018 at the Institute of Health and Biotechnology (ISB) of the Federal University of Amazonas (UFAM), in the municipality of Coari, Amazonas.

The institute is located in the municipality of Coari, approximately 363 km from the capital, Manaus, which can be reached by river or air. The institute offers seven undergraduate courses: Nutrition; Sciences: Mathematics and Physics; Biotechnology; Sciences: Biology and Chemistry; Physiotherapy; Nursing; and Medicine.

During the study period, the institution had 992 regularly enrolled students. A non-probabilistic quota sample was used, in which a proportional calculation was made for each course, considering 70% of each, which follows the sampling process of a previously published study.[17]

The inclusion criteria were being duly enrolled in an undergraduate program, being at least 18 years old, and attending university during the study period. The exclusion criteria were being an Indigenous student and being absent from at least three classroom interactions with the data collection team.

Data collection took place between March and July 2018 using a questionnaire tested in a pilot study for later application to the target population. The questionnaire comprised sociodemographic variables, self-reported medical conditions, and information on medication use. Participants were interviewed in classrooms with the professor's consent, during class breaks, or on university premises.

The dependent variable was the use of at least one antibiotic in the 30 days preceding the interview. The independent variables consisted of the remaining variables from the questionnaire sections (age, sex, marital status, family income, course of study, graduation year, number of antibiotics used, and health problem).

Data were analyzed using SPSS (Statistical Package for Social Sciences) 20.0 for Windows. Antibiotics were classified using the Anatomical Therapeutic Chemical Classification (ATC) system, adopted by the WHO and recommended for drug utilization studies. Level 5 was used in this study.

The Guidelines and Regulatory Standards for Research Involving Human Subjects, as established in current resolutions, were strictly followed. The study was submitted to the Research Ethics Committee of the Federal University of

Amazonas and received approval under CAAE number 74919717.1.0000.5020.

RESULTS

A total of 694 students participated in the study, of which 483 (69.6%) had consumed medications in the last 30 days. The prevalence of antibiotic consumption among undergraduate students was 15.3% (74).

Among the students who consumed antibiotics, females prevailed (73.0%), young people aged between 18 and 22 years (70.3%), students with a family income of up to two minimum wages (40.5%) and those in the second and fourth period (28.4%) (Table 1).

Table 1- Socioeconomic and demographic profile of students who used antibiotics. Coari, AM, Brazil, 2018.

Variables	Antibiotic consumption n=74(%)
Gender	
Feminine	54(73.0)
Masculine	20(27.0)
Age Range	
18 to 22 years old	52(70.3)
23 to 28 years old	15(20.3)
31 to 60 years old	7 (9.4)
Marital status	
Single	57(77.0)
Not Single	17(23.0)
Family Income	
Less than 1 Minimum Wage	23(31.1)
1 to 2 Minimum Wages	30(40.5)
Up to 3 Minimum Wages	14(18.9)
Above 4 Minimum Wages	7(9.5)
Period	
Second Period	21(28.4)
Fourth Period	21(28.4)
Sixth Period	10(13.5)
Eighth Period	15(20.3)
Tenth Period	7(9.4)

Source: authors' data.

Regarding the method of antibiotic consumption practiced by students, half resorted to self-medication (50.0%) in the last 30 days.

Regarding the type of consumption by undergraduate area, the consumption of self-medicated antibiotics prevailed among students in other areas (65.4%), while those in the health area prevailed those prescribed (58.3%). Among the courses, the highest frequencies of self-medication occurred among students of Biotechnology (75.0%), Sciences: Biology/Chemistry (68.8%) and Nutrition (53.8%), in contrast, the consumption of prescribed antibiotics prevailed among students of Physiotherapy (69.2%), Medicine (66.7%), and Nursing (57.9%) (Table 2).

Table 2- Distribution of students by course and field of study who used antibiotics, according to the type of use. Coari, AM, Brazil, 2018.

Variables	Self-medicated n=37(%)	Prescribed n=37(%)	Total n= 74(%)
Undergraduate Area			
Other Areas**	17(65.4)	9(34.6)	26(100.0)
Health*	20(41.7)	28(58.3)	48(100.0)
Course			
Biotechnology	3(75.0)	1(25.0)	4(100.0)
Sciences: Biology and Chemistry	11(68.8)	5(31.2)	16(100.0)
Nutrition	7(53.8)	6(46.2)	13(100.0)
Sciences: Mathematics and Physics	3(50.0)	3(50.0)	6(100.0)
Nursing	8(42.1)	11(57.9)	19(100.0)
Medicine	1(33.3)	2(66.7)	3(100.0)
Physiotherapy	4(30.8)	9(69.2)	13(100.0)

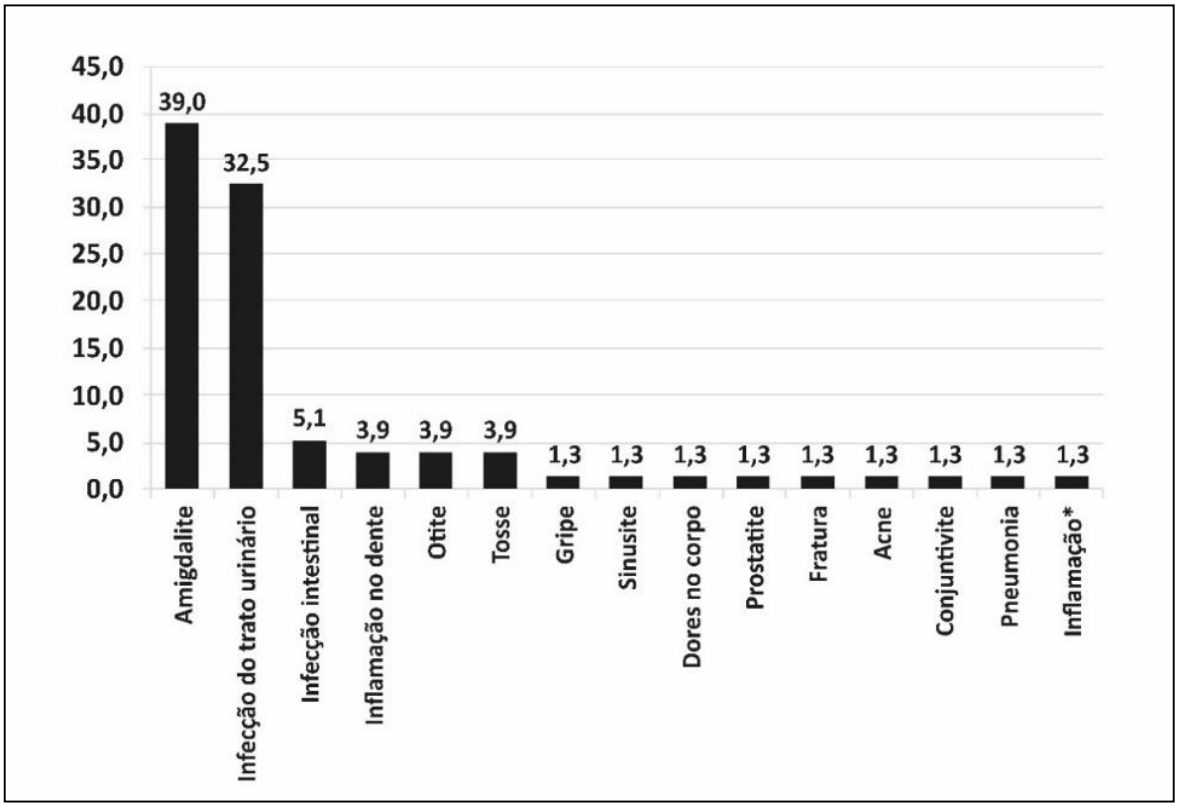
*Health: Nursing, Nutrition, Physiotherapy, Medicine; **Other Areas: Science: Biology and Chemistry, Science: Mathematics and Physics, Biotechnology.
Source: authors' data.

The study mentioned the consumption of seven different antibiotics, consumed on 77 occasions (some participants used more than one antibiotic), with a total of 38 due to self-medication. Regarding the most consumed chemical substances among antibiotics, amoxicillin stood out (44.7%), followed by azithromycin (23.7%), cephalexin (15.8%) and other antibiotics (ciprofloxacin, ampicillin, tetracycline and getamycin – 15.8%).

The main place for acquiring self-medicated antibiotics was pharmacies

(87.0%), followed by hospitals (5.2%), family members (5.2%) and friends/neighbors (2.6%).

Regarding the health reasons that most led to the consumption of antibiotics, tonsillitis (39.0%), urinary tract infection (32.5%) and intestinal infection (5.1%) stood out (Figure 1).



Source: authors' data.

Figure 1- Main health reasons for antibiotic use among study participants. Coari, AM, Brazil, 2018.

DISCUSSION

Of the undergraduate students participating in the study, a large proportion reported having taken medication in the 30 days prior to the interview. Among these, the prevalence of antibiotic use was high. Most users were young female adults. Regarding the mode of consumption, half of the participants resorted to self-medication, a practice more common among academics outside the healthcare field. The most commonly consumed substances were amoxicillin, followed by azithromycin. Pharmacies were the main source of purchase for these medications. Regarding the health problems that most often justified antibiotic use, tonsillitis, urinary tract infections, and intestinal infections stood out.

When analyzing the mode of consumption, half of the students self-medicated with antibiotics. In a previous study conducted at the same institution with nursing students, the practice was common among students and continues, not only in the nursing program but also in all undergraduate programs. It is possible that despite the results obtained previously, no measures were adopted to raise awareness about the rational use of these medications, or that the ease of acquiring these supplies favors their indiscriminate use.

The self-medication rates in this study exceeded those found among undergraduate students in Paraná (26%).[16] The high rates in this study, compared to those found in other regions, may be explained by the ease of access to over-the-counter antibiotics in pharmacies in Coari, highlighting the need for greater oversight at the points of sale of these supplies. These findings are alarming, since self-medication can contribute to bacterial resistance, and the presence of this practice in the study may suggest the irregular sale of these products by pharmacies in the municipality, contrary to the recommendations of ANVISA Resolution RDC No. 44 of October 26, 2010.[18]

Self-medication with antibiotics was more prevalent among students who were not in the health field. Similar results were found in a study conducted among students at a university in Malaysia, in which self-medication was more prevalent among non-medical students. It is possible that health field students are more aware of the dangers of indiscriminate antibiotic use compared to students in other fields, thus reducing the rate of this behavior in this group.

Amoxicillin was the most consumed antibiotic among students in Coari, which corroborates the findings of studies conducted with university students in China (56%)[7] and Tanzania (32%).[4] The high consumption of this chemical substance may be related to the low cost of this antibiotic or because it is the most used by doctors to carry out treatments, in addition to the easy availability of antibiotics on the market.[13]

The study showed that self-medicated antibiotics were acquired mainly in pharmacies, as in the study carried out in Ghana.[12] The acquisition of antibiotics without a prescription in pharmacies in the municipality of Coari is serious and highlights failures by the competent bodies in monitoring the sale of these products in pharmacies, as already pointed out in previous studies carried out in the municipality.[18]

Tonsillitis stood out as the main health reason that led students to take antibiotics. It is noteworthy that when this disease is caused by a virus, antibiotics have no effect on the infectious agent; on the

contrary, they perform an unnecessary selection of bacteria present in the human body, which contributes to bacterial resistance.[3]

The study has limitations due to the use of non-probability quota sampling, as it did not consider all enrolled students. However, it was decided to include students from different fields, taking into account the proportion of each program. These limitations should be considered when interpreting the results. Another point worth noting was the use of a questionnaire instead of a form, which may have led to underreporting. Furthermore, the study design used did not allow for inferences or conclusions about a cause-and-effect relationship based on the results.

CONCLUSION

The study revealed that self-medication with antibiotics is prevalent among the students in the study, especially those outside of the healthcare field. This behavior poses a serious risk due to the indiscriminate use of antibiotics, which can result in bacterial resistance and, consequently, increase mortality and infection-related costs. These findings can serve as a basis for the development of health education programs aimed at informing and raising awareness among undergraduate students about the appropriate use of antibiotics, helping to reduce inappropriate consumption. Furthermore, the study's findings have the potential to influence the formulation of more effective health policies related to controlling the consumption of antibiotics without professional prescription.

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