



## Review article

### Indiscriminate use of antibiotics: an integrative review

#### *Uso indiscriminado de antibióticos: uma revisão integrativa*

Ana Monique Gomes Brito<sup>1</sup> , Adriely Pereira Versiani<sup>2</sup>, Malba Thaã Silva Dias<sup>2</sup> , Álvaro Parrela Piris<sup>2,3</sup> .

<sup>1</sup>Postgraduate Program in Health Sciences at the State University of Montes Claros (Unimontes), Montes Claros-MG, Brazil.

<sup>2</sup>University Center of the North of Minas, Montes Claros-MG, Brazil.

<sup>3</sup>State University of Montes Claros (Unimontes), Montes Claros-MG, Brazil.

#### Abstract

**Objective:** identify the main consequences of indiscriminate use of antibiotics from an integrative revisional study. **Materials and Methods:** electronic research was conducted in the SciELO databases and Virtual Health Library. The search was conducted between February and March 2015. The inclusion of publications was defined from the analysis of titles, abstracts and keywords. In cases where this was not satisfactory to define the number of publications, the text was read in its entirety. 11 scientific articles were selected. **Results:** most publications took place between 2010 and 2011. No scientific publications were found in 2015. Regarding the type of study, five studies were observational and six were literature reviewed. **Conclusion:** indiscriminate use of antibiotics and medications in general can cause damage related to body vesicles, nausea, vomiting, irritation, allergic reactions, intestinal cramps, skin reactions, kidney injury, hospitalizations for falls with or without fractures, intoxication and dehydration caused by vomiting; pregnant women may also be able to cause toxic effects on the fetus.

**Keywords:** Side effects and drug-related adverse reactions. Antibacterial. Intoxication.

#### Resumo

**Objetivo:** identificar as principais consequências do uso indiscriminado de antibióticos, a partir de um estudo revisional integrativo. **Materiais e Métodos:** foi realizada pesquisa eletrônica nas bases de dados SciELO e Biblioteca Virtual em Saúde. Realizou-se a busca entre os meses de fevereiro e março de 2015. A inclusão das publicações foi definida a partir da análise dos títulos, resumos e palavras-chave. Nos casos em que isso não foi satisfatório para definir o enquadre das publicações, realizou-se a leitura do texto na íntegra. Foram selecionados 11 artigos científicos. **Resultados:** a maioria das publicações ocorreu entre os anos de 2010 e 2011. Não foram encontradas publicações científicas em 2015. Quanto ao tipo de estudo, cinco estudos foram observacionais e seis de revisão de literatura. **Conclusão:** o uso indiscriminado de antibióticos e de medicamentos em geral pode causar danos relacionados à vesículas corporais, enjoo, vômito, irritação, reações alérgicas, cólicas intestinais, reações cutâneas, lesão renal, hospitalizações por quedas com ou sem fraturas, intoxicação e desidratação causada por vômitos; podendo ainda, nas gestantes, ser capaz de provocar efeitos tóxicos ao feto.

**Palavras-chave:** Efeitos colaterais e reações adversas relacionados a medicamentos. Antibacterianos. Intoxicação.

**Corresponding author:** Ana Monique Gomes Brito | [anamoniquegomes@gmail.com](mailto:anamoniquegomes@gmail.com)

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## Introduction

Some microorganisms make up the resident microbiota and others are capable of generating great damage to the health of affected individuals. The indiscriminate use of antibiotics can cause a number of changes in the balance of the human body, which can trigger simple adverse effects or consequences of medium and high complexity. It may cause unpleasant signs and symptoms capable of destabilizing the patient's clinical picture. They are used very often in hospitals or even at home, when the patient's clinical picture does not require hospitalization<sup>1</sup>.

These drugs should be prescribed for medical evaluation and after identification of the bacterium. Inappropriate use favors the resistance of bacteria and the worsening of the general health status of the patient with the emergence of possible adverse effects<sup>2-4</sup>. Microorganisms that represent great concern include vancomycin-resistant *Staphylococcus aureus* (VRSA), methicillin-resistant *Staphylococcus aureus* (MRSA), *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*, which are bacteria resistant to various drugs. As a consequence of this factor, the rapid evolution of antibiotic resistance has reduced the arsenal of drugs available to combat these microorganisms<sup>5</sup>.

Bacterial resistance alters the procedure of prescription and use of antibiotics, because the health professional needs to find a new therapy capable of fighting the microorganism<sup>6</sup>. The World Health Organization points out that 50% of antibiotic prescriptions are considered inadequate to treat them<sup>7</sup>; this data demonstrates the need for antimicrobial control programs that identify better procedures to treat and treat patients, track bacterial multiresistance and reduce adverse effects<sup>7-9</sup>.

In this sense, the aim of this study was to identify the main consequences of indiscriminate use of antibiotics, based on an integrative revisional study.

## Materials and Methods

This is an integrative review that made it possible to collect information in a systematized way. An electronic search was performed in the Scientific Electronic Library Online (SciELO) and Virtual Health Library (VHL) databases, based on the use of the following terms registered in the Health Sciences Descriptors (DeCS), applying the operator and: side effects and adverse reactions related to AND antibacterial drugs AND Intoxication. The terms were applied in an associated way in the databases mentioned between February and March 2015. Scientific articles of any design published between 2010 and 2015 in the Portuguese and available as full text were included.

The inclusion of publications was defined from the analysis of titles, abstracts and descriptors of the articles. In cases where this was not enough to define the number of publications, the text was read in its entirety. 19 articles were selected (13 in SciELO 06 in the VHL). It is noteworthy that, of the total of 19 articles found, 08 articles were present simultaneously in the databases surveyed, having been subtracted, totaling 11 articles.

form was used to collect and organize the collected data composed of the following items: title; authors; year; place of execution of the study; sample; objective; design; and key results. From the analysis of the articles, discussions were formulated about the main results and conclusions of the study.

## Results

After careful analysis of the 11 selected articles, some of their characteristics were extracted, which are presented in Chart 1. It was observed that most of the publications that discuss the theme occurred between 2010 and 2011, with a reduction in the years 2012, 2013 and 2014.

No scientific publications were found in 2015 in the databases surveyed. Regarding the type of study, five studies were observational and six were literature reviewed.

## Discussion

Publications related to the theme are scarce, which limited the organization and discussion of the data. Presquisa points out that the prevalence of antibiotic use is higher among women. However, there is an increase in use as the age group of individuals increases. Among the complications of the use of antibiotics indiscriminately, sleep, fatigue, body vesicles, nausea, vomiting, irritation, allergy and intestinal cramps stand out<sup>10</sup>.

Study reveals that skin reactions are the most frequent consequences among women and men. Among the reported adverse reactions, women have a higher incidence of rashes than men. Also in this study, they also highlight that antibiotics have the ability to cause kidney lesions and harmful effects to renal excretion, such as reduction of renal clearance<sup>11</sup>. Another study describes that allergic reactions to medications are adverse events that do not result from known toxicological properties of the drug, which result from immunological reactions and their metabolites<sup>12</sup>.

**Chart 1** – Characteristics of the selected articles.

Author and year	Delimitation	Sample and scenario	Objective
Del Fiol and Silva, 2014	Literature review	-	Provide the indications and risks of the use of tetracycline in pregnancy.
Braios <i>et al.</i> , 2013	Observational/transversal	470 individuals residing in the municipality of Jataí-GO.	To know the profile of use, prescription and commercialization of antimicrobials by the different demographic and social strata of the population of Jataí-GO.
Paula, Bochner and Montilla, 2012	Observational/documentary and retrospective	Elderly aged $\geq 60$ years, with records of hospitalizations in Brazilian territory between 2004 and 2008, according to IBGE/Datasus estimates.	Determine the main therapeutic classes involved in hospital admissions of the elderly due to intoxication and adverse effects of medications, as well as the main injuries related to these events.
Carneiro <i>et al.</i> , 2011	Observational/documentary and transversal	Analysis of 846 medical records of patients who were admitted to Hospital Santa Cruz-HSC (Santa Cruz do Sul-RS), from July 10 to 18, 2009.	Evaluate the indications of prescriptions regarding the appropriate use of antimicrobials.
Mota <i>et al.</i> , 2011	Literature review	-	Discuss the indiscriminate utilization of antimicrobials in animals and their contribution to bacterial multiresistance
Costa, Bastos and Carvalho, 2011	Literature review	-	Present an overview of current knowledge about the physiological and molecular mechanisms responsible for gender variability (male and female) as a relevant factor for the pharmacological responses and adverse effects of relevant and highly consumed drugs in Portugal.
Wannmacher, 2011	Literature review	-	Discuss the spread of microbial resistance due to the irrational use of antibiotics.
Santos and Nitrinib, 2010	Observational/transversal	WHO medication use indicators: prescription indicators: 10 health units and 6,692 prescriptions from clinicians and pediatricians; patient care indicators: 30 patients in each unit. The study was carried out in Ribeirão Preto-SP.	Describe the therapeutic practice of allopathic physicians and evaluate outpatient care provided to patients in health units
Rodrigues and Bertoldi, 2010	Observational/cross-sectional and descriptive	Prescriptions of patients admitted to a private hospital in Santa Maria-RS, from March to June 2006, who received at least one treatment with systemic antimicrobial.	Describe the profile of antimicrobials used in a private hospital, analyzing the medical prescriptions of this group of medicines by medical clinic and age group of patients.
Zimmerman, 2010	Literature review	-	Address the indiscriminate use of antimicrobials as the main factor for the development of bacterial resistance.
Oliveira and Munaretto, 2010	Literature review	-	Present problems related to the use of antibiotics and propose strategies to lead to the rational use of these medications.

Directing the consequences of the use of antibiotics to the elderly, it was found that this group suffers the most from the effects of these medications. Hospital admissions due to intoxication, falls with or without fracture, relatively severe gastric alterations, presence of nausea and vomiting with subsequent evolution to dehydration and cardiac alterations are observed<sup>13</sup>.

For pregnant women, the risk will always be present for the mother's health and fetal development, since antibiotics in general have low molecular weight and can promote diffusion through the placenta and excretion by milk, leaving the fetus to the possible toxic effects of these drugs. It is noteworthy the need to analyze the risk/benefit before opting for an antibiotic during pregnancy, that is, in cases where the benefits of its use are greater than the risks of its use<sup>14</sup>.

The recommendation for antibiotic therapy among pediatric patients and over 50 years in a hospital setting is higher due to the immunological status and associated diseases. Research found that the hospitalization time was prolonged among patients who used antibiotics, since they presented weakness, heartburn and lower evolution of general health status. It is noteworthy that when inadequately employed this drug class is associated with the risk of toxicity, selection of resistant pathogens and rise in institutional costs<sup>6</sup>.

Microbial resistance is defined by strains of microorganisms that are able to multiply even with the presence of antibiotics at the highest therapeutic concentrations adopted to humans. This resistance is a public health problem that leads to the need to create public policies so that the entire population becomes aware of the harms of improperly employing medications that were created to improve the quality of life of individuals<sup>4</sup>. Resistant microorganisms are responsible for exorbitant expenses borne by public health.

Research confirms and accents that the emergence of new resistant and pathogenic microorganisms is faster than the ability of laboratories and pharmaceutical industries to create new drugs. They also suggest strategies to minimize resistance, such as: reduction in the number of prescriptions, education of the population through national dissemination, use of laboratory tests to precisely identify the type of bacteria and the best medication to combat it and training for prescribers<sup>15,16</sup>.

In health services, the monitoring of prescriptions, dispensing and use of medications by individuals must exist efficiently for patient care to happen. Approaching the patient about the correct dose, time and time of treatment makes it possible to correct errors and avoid the occurrence of side effects and their consequences<sup>17</sup>.

## Conclusion

Indiscriminate use of antibiotics can cause health damage such as body vesicles, nausea, vomiting, irritation, allergic reactions, intestinal cramps, skin reactions and kidney injury. The situation was even more severe among the elderly with hospitalizations for falls with or without fractures, intoxication and dehydration caused by vomiting; among pregnant women, indiscriminate use can cause toxic effects on the fetus. Risk of toxicity, selection of resistant pathogens and increased costs were other problems identified in the hospital environment.

## Authors' contribution

All authors approved the final version of the manuscript and declared themselves responsible for all aspects of the work, including ensuring its accuracy and integrity.

## Conflict of interests

The authors declare that there are no conflicts of interest.

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