

## How Safe are Antibiotics?

Sayan Bhattacharyya\*

Associate Professor, Microbiology, AIHH&PH, Kolkata

**\*Corresponding Author:** Sayan Bhattacharyya, Associate Professor, Microbiology, AIHH&PH, Kolkata

**Received Date: November 15, 2022; Accepted Date: December 26, 2022; Published Date: January 10, 2023**

**Citation:** Sayan Bhattacharyya (2023), How Safe are Antibiotics?, *International Journal of Clinical Surgery* 2(1); DOI:10.31579/2834-5118/016

**Copyright:** © 2023, Sayan Bhattacharyya, this is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### Abstract

Antibiotic resistance is a real menace nowadays. Adverse effects of antibiotics are also coming up at the same time. Everyone needs to know the adverse effects and dosages of the common antibiotics so that proper antibiotic stewardship can become a reality.

**Keywords:** antibiotics; safe; knowledge

### Introduction

Antibiotics are antibacterial compounds. The broad umbrella term is antimicrobials which covers antibacterial compounds, antiviral drugs, antiparasitic drugs and also antifungal drugs. All antibiotics can have some adverse or untoward effects like rashes, vomiting and diarrhoea. Some more adverse effects are demonstrated by specific antibiotics. Knowledge of these adverse effects are vital in order to institute an antibiotic policy by the hospital or healthcare facility.

The first naturally derived antibiotic was discovered accidentally in 1928 in St. Mary's Hospital, London by Alexander Fleming from the fungus *Penicillium notatum* [1]. Florey, Chain and others took Penicillin to clinical use in 1941. Many other classes of antibiotics were also later discovered, like quinolones, fluoroquinolones and sulfonamides. However, soon some

adverse effects of antibiotics came to light. Also resistance to several antibiotics came up.

Many antibiotics can just cause a taste alteration like metallic taste in the mouth. It is common with nitroimidazoles like Metronidazole. Also, sometimes the side effects are so mild that it may resemble features due to the infection also, like nausea and vomiting [2]. However, sometimes the adverse effects are quite serious and even irreversible. Several times the antibiotics given may also interact with several drugs or other antibiotics given simultaneously.

The common adverse effects and drug interactions of antibiotics are listed below [2,3,4,5,6]:

Group of antibiotics	Adverse effects	Drug interactions	Remarks
Beta lactams	Nausea, vomiting, rashes, allergy	H2 antagonists like Cimetidine and ranitidine can reduce blood levels of Bacampicillin but not other penicillins	Cephalosporins are always ineffective against <i>Enterococcus</i> spp.
Fluroquinolones	Nausea, vomiting, tendinopathy in less than 18 years of age which may result in stunted growth(in animal models, but may be possible in man too), dysglycemia, teary eyes and blurred vision in case of Gatifloxacin (which is now withdrawn from the market)	The absorption of fluoroquinolones can be markedly lowered by drugs like antacids, calcium carbonate, ferrous sulphate and sucralfate	They are mostly ineffective against <i>N. gonorrhoeae</i> and <i>S. Typhi</i> now
Macrolides (like Erythromycin and Azithromycin)	Rashes, vomiting, gastrointestinal upset, irregular heart rhythms that	Can cause synergistically dangerous prolongation of the QT interval in ECG if	Dose has to be adjusted according to body fat since

	are irreversible, drug induced mixed hepatitis (idiosyncratic)	taken with chloroquine or hydroxychloroquine	they get sequestered in body fat
Aminoglycosides (like Gentamicin and Streptomycin)	Deafness (with kanamycin), kidney dysfunction (with gentamicin)	Some drug interactions are noted with BCG, Cidofovir and streptozocin	--
Chloramphenicol	Rashes, vomiting, grey baby syndrome (idiosyncratic aplastic anemia that is irreversible)	Concomitant use of live BCG vaccine, lurasidone (an antipsychotic) is not recommended.	Should be used very carefully
Metronidazole	Metallic taste of mouth, carcinogenic in rats and mice models, disulfiram like reactions	disulfiram like reactions when given in alcoholics	--
Nitrofurantoin	Dermatological reactions, rarely Pulmonary toxicity, like chronic pulmonary reactions, diffuse interstitial pneumonitis, pulmonary fibrosis, or both that are irreversible.	BCG vaccine and cholera vaccine need to be avoided at the same time	Effective in man only in lower urinary tract infections and fails to attain therapeutic concentrations in upper urinary tract
Sulfonamides (like Trimethoprim-Sulfamethoxazole)	Hyperkalemia, Hypersensitivity reactions (0.09%) like anaphylaxis, Stevens-Johnson syndrome, toxic epidermal necrolysis, serum sickness-like syndrome, lupus-like syndrome, pneumonitis, hepatitis and interstitial nephritis.	Reduces protein binding of warfarin when given together and this potentiates its action	---
Rifamycins, like Rifampicin	Hepatitis, Orange discoloration of secretions of the body	Its metabolism is often enhanced by protease inhibitors, hence Rifabutin has to be given in TB in HIV positive patients	Should never be used as monotherapy since resistance can develop rapidly

There are many reasons for these adverse effects, like their metabolism, chemical properties and pharmacodynamics. Other effects are also marked with some antibiotics, like irreversible staining of teeth enamel with Tetracycline. This happens because Tetracycline, being a strong chelator, binds well to the hydroxyapatite portions of the growing parts of bones and teeth [7].

### The way forward

Clinicians and also common people need to be aware of the mild and serious side effects of the common antibiotics. This awareness can be generated among the general public about the adverse effects of the commonly used antibiotics and antimicrobials in general. These things should also be part of the curricula of undergraduate and postgraduate students of medical and paramedical courses, so that sufficient knowledge about these adverse effects are there among them.

### Discussion

The adverse effects of antibiotics need to be kept in mind while prescribing to patients. Pharmacists and other personnel also need to know these things in order to establish good antibiotic prescription norms and reduce the burden of adverse effects of antibiotics. The drug interactions of these antibiotics also need to be known so that those drugs should be avoided and not given concomitantly. Unnecessary use of antibiotics is particularly concerning because antibiotics may be associated with a number of such adverse drug events (also called ADEs) [8]. Scheduling of drugs and restricting their over the counter use may go a long way also in minimizing their adverse effects

and drug interactions. This should lead us to an era where adverse effects of antibiotics are rare.

### References:

1. Discovery and Development of Penicillin. <https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/flemingpenicillin.html#:~:text=In%201928%2C%20at%20St.,number%20of%20deaths%20from%20infection.>
2. Mohsen S, Dickinson JA. (2020). Update on the adverse effects of antimicrobial therapies in community practice. *Canadian Fam Phys.* 65:1-659.
3. Bactrim [product monograph]. (2010). Philadelphia, PA: AR Scientific;
4. Determination That TEQUIN (Gatifloxacin) Was Withdrawn From Sale for Reasons of Safety or Effectiveness.
5. Neuhauser MM, Danziger LH. In: *Infectious Disease: Drug Interactions in Infectious Diseases*, Second Edition Edited by: S. C. Piscitelli and K. A. Rodvold © Humana Press Inc., Totowa, NJ, USA.
6. Janknegt R. (1990). Drug interactions with quinolones. *J Antimicrob Chemother.* D:7-29.
7. Aminov RI. (2010). A brief history of the antibiotic era: lessons learned and challenges for the future. *Frontiers Microbiol* 1, article 134.
8. Tamma PD, Avdic E, Li DX, Dzintars K, Cosgrove SE. (2017). Association of Adverse Events With Antibiotic Use in Hospitalized Patients. *Jama Int Med.* 177(9):1308-1315.

**Ready to submit your research? Choose ClinicSearch and benefit from:**

- fast, convenient online submission
- rigorous peer review by experienced research in your field
- rapid publication on acceptance
- authors retain copyrights
- unique DOI for all articles
- immediate, unrestricted online access

**At ClinicSearch, research is always in progress.**

Learn more <http://clinicsearchonline.org/journals/international-journal-of-clinical-surgery>



© The Author(s) 2022. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.