WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

The Antibiotics

JAGDAMBI KUMAR PANDIT, DR. KAUSHAL.K.CHANDRUL, DR. GOURAV KUMAR. SHARMA,

FACULTY OF PHARMACUETICAL SCIENCE MEWAR UNIVERSITY , CHITTORGARH , RAJASTHAN

ABSTRACT

Physicians mention patients' expectations as a reason for prescribing antibiotics for common upper respiratory tract infections despite clinical evidence against their use and the physicians' better judgement. We aimed to assess the prevalence of such expectations and factors of influence (knowledge and attitudes) in Germany's general population. In November 2008, 1,778 persons registered with a large market research company were invited to complete an online questionnaire on expectations concerning prescription of antibiotics and on knowledge and attitudes regarding the effectiveness and use of antibiotics for upper respiratory tract infections. A total of 1,076 persons aged 15-78 years participated (response: 61%), of whom 91.8% reported using antibiotics 'only if absolutely necessary'. Prescription of antibiotics was expected by 113 (10.5%) of the 1,076 respondents for the common cold and by 997 (92.7%) for pneumonia. In a logistic regression analysis, predictors for expecting a prescription for antibiotics for the common cold included the following opinions: 'common cold or flu can effectively be treated with antibiotics' (prevalence: 37.6%; odds ratio (OR): 9.6; 95% confidence interval (CI): 3.8 to 24.3) and 'antibiotics should be taken when having a sore throat to prevent more serious illness' (prevalence 8.6%; OR: 7.6; 95% CI: 3.9 to 14.5). Among those expecting a prescription (n=113), 80 (71%) reported that they would trust their physician when he or she deems a prescription unnecessary; a further eight (7%) would be unsatisfied, but would accept the decision. Our results suggest that only a minority expects antibiotics for the treatment of cold symptoms. Physicians should be educated that their decisions not to prescribe antibiotics for the common cold, even when against patients' expectations, are apparently accepted by the majority.

Keywords:-: Antibiotics, expectation, judgement, population, infecation, physicians.

1. INTRODUCTION

Antibiotics, either are cytotoxic or cytostatic to the micro-organisms, allowing the body's natural defenses, such as the immune system, to eliminate them. They often act by inhibiting the synthesis of a bacterial cell, synthesis of proteins, deoxyribonucleic acid (DNA), ribonucleic acid (RNA), by a membrane disorganizing agent, or other specific actions . Antibiotics may also enter the cell wall of the bacteria by binding to them, using the energy-dependent transport mechanisms in ribosomal sites, which subsequently leads to the inhibition of the protein synthesis .

To combat against infections or microbes, undoubtedly antibiotics are a blessing to human civilization that has saved millions of people . Multiple varieties of the antibiotics have been used for therapeutic purposes over time. Antibiotics were seen as the 'wonder drug' in the mid-20th century. At the time, there was an optimistic belief that communicable disease was nearly coming to a complete halt. The beginning of modern "antibiotic era" was synonymously associated with two names Alexander Fleming and Paul Ehrlich . Antibiotics were considered a magic bullet that selectively targeted microbes that were responsible for disease causation, but at the same time would not affect the host. Fleming was the first who cautioned about the potential resistance to penicillin if used too little or for a too short period of treatment . The period from the 1950s to 1970s was thus considered as the golden era for the discovery of novel antibiotics classes .

Millions of metric tons of newer classes of antibiotics have been produced in last 60 years since its inception. Increased demand for antibiotics across many sectors has allowed for less expensive and off-label uses of drugs. Conversely, due to the enormous and irresponsible use of the antibiotics, has contributed significantly to the advent of the resistant strains . In the previous days, the production of new antibiotics was directly proportional to the development of resistant strains. However, the mainstream approach in fighting against the diseases is now focused on the modification of existing antibiotics to combat emerging and re-emerging resistance of pathogens globally .

Resistance to an antibiotic develops in no time and hence, is a big matter of concern . With the improvement of technology, more people are now aware of the ill-effects caused by resistance to the available drugs, however, very few take pro-active steps to curb the resistance by not over using the antibiotics . In the developing world, almost all the antibiotics are available over the counter and can be bought without any medical prescription which is one of the most important factors in causing the resistance. Therefore, if the resistance to the antibiotics needs to be curbed, the only way shall be to educate the patients and the general public.

The present review is one such way to educate the public by showing the development and plausible future of antibiotic resistance and existing regulation to reduce the antibiotic resistance crisis.

An antibiotic is a type of antimicrobial substance active against bacteria. It is the most important type of antibacterial agent for fighting bacterial infections, and antibiotic medications are widely used in the treatment and prevention of such infections.[1][2] They may either kill or inhibit the growth of bacteria. A limited number of antibiotics also possess antiprotozoal activity.[3][4] Antibiotics are not effective against viruses such as the

common cold or influenza;[5] drugs which inhibit viruses are termed antiviral drugs or antivirals rather than antibiotics.

Types of antibiotics

(a) Penicillins
(b) Cephalosporins
(c) Macrolides
(d) Fluoroquinolones (broad-spectrum antibiotics)
(e) Sulfonamides
(f) Tetracycline

Other Types of Antibiotics

Doctors have several other antibiotic choices if none of these classes will work. You will find some of them only in a hospital. Others just don't fit into the main groups, but are very useful. This includes antibiotics like

(g) clindamycin,
(h) metronidazole (Flagyl)
(i) nitrofurantoin (Furadantin, Macrodantin).

Each antibiotic, whether in a defined class or not, has different dosing requirements. You need to take some on an empty sto ach and others with food. Ask your doctor or pharmacist about the best way to take an antibiotic. With all antibiotics, it's important to finish the entire course your doctor prescribes. This ensures adequate treatment and prevents antibiotic resistance.

Penicillins

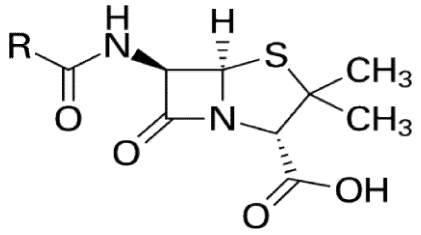
INTRODUCTION

Penicillin was the first antibiotic to be used clinically in (1941) .the first penicillin gave rise to an entire class of antibiotics known as penicillin . penicillin are derived from a specific meld (a type of fungi) – penicillin. They are widely useful antibiotics that are often a doctor's first choice for several types of infection . This includes skin, respiratory, ear, sexually transmitted diseases, and dental infection.

Common side effects :-Diarrhea, nausea, and abdominal pain .

Examples of penicillines :-

- Amoxicillin
- Ampicillin
- Penicillin G
- Penicillin V
- **Chemical structure :- (C16H18N2O4S)**



MECHANISM OF ACTION

Penicillin kills bacteria through binding of the beta-lactam ring to DD-transpeptidase, inhibiting its cross-linking activity and preventing new cell wall formation. Without a cell wall, a bacterial cell is vulnerable to outside water and molecular pressures, which causes the cell to quickly die. Since human cells do not contain a cell wall, penicillin treatment results in bacterial cell death without affecting human cells.

ROUTES OF ADMINISTRATION :-

For amoxicillin:

For bacterial infections:

- For oral dosage forms (capsules, oral suspension, tablets, and chewable tablets):
  - Adults, teenagers, and children weighing more than 40 kilograms (kg) (88 pounds)—250 to 500 milligrams (mg) every eig t hours or 500 to 875 mg every twelve hours, depending on the type and severity of the infection.

For ampicillin:

- For bacterial infections:
  - For oral dosage forms (capsules and oral suspension):
    - Adults, teenagers, and children weighing more than 20 kilograms (kg) (44 pounds)—250 to 500 milligrams (mg) every six hours.

For penicillin G:

- For bacterial infections:
  - For oral dosage form (oral solution, oral suspension, and tablets):
    - Adults and teenagers—200,000 to 500,000 Units (125 to 312 milligrams [mg]) every four to six hours.
    - Infants and children less than 12 years of age—Dose is based on body weight and must be determined by your doctor.

For penicillin V:

- For bacterial infections:
  - For the benzathine salt oral dosage form (oral solution):
    - Adults and teenagers—200,000 to 500,000 Units every six to eight hours.
    - Children—100,000 to 250,000 Units every six to eight hours.

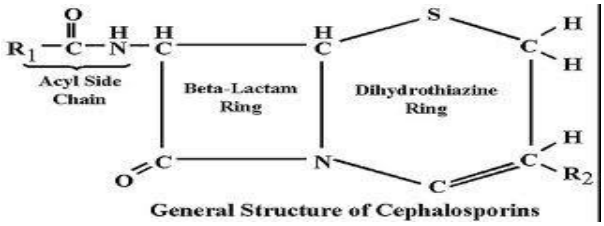
Cephalosporins :-

INTRODUCTION :-These are a group of semisynthetic antibiotic derived form (cephalosporium –c) obtained from a fungus cephalosporium. They both belong to a large class called beta lactams . There are five generations of cephalosporins .Each generation covers different types of bacteria . As a result the class can treat a variety of infections fromstrepthroat and skin infection to very serious infection like meningitis . Because they are related to penicillin allergies may also react to cephalosporins.

Common side effects :- Diarrhea, nausea, heartburn, and abdominal pain .

Examples of cephalosporins :-

- Cefixime
- cefpodoxime
- cefuroxime
- cephalexin
- **Chemical structure :- (c15H21N3O7S)**



General Structure of Cephalosporins

MECHANISM OF ACTION

Cephalosporins are bactericidal and have the same **mode of action** as other β-lactam antibiotics (such as penicillins), but are less susceptible to β-lactamases. **Cephalosporins** disrupt the synthesis of the peptidoglycan layer forming the bacterial cell wall.

ROUTES OF ADMINISTRATION :

DOSAGE ANDADMINISTRATION:

Cephalexin is administered orally.

Adults-- The adult dosage ranges from 1 to 4 g daily in divided doses. The 333 mg and 750 mg strengths should be administered such that the daily dose is within 1 to 4 grams per day. The usual adult dose is 250 mg every 6 hours. For the following infections, a dosage of 500 mg may be administered every 12 hours:

DOSAGE AND ADMINISTRATION

Cefiximr is administered orall*Adults*: The recommended dose of cefixime is 400 mg daily. This may be given as a 400 mg tablet or capsule daily or the 400 mg tablet may be split and given as one half tablet every 12 hours. For the treatment of uncomplicated cervical/urethral gonococcal infections, a single oral dose of 400 mg is recommended. The capsule and tablet may be administered without regard to food.

MACROLIDES

INTRODUCTION

Macrolides are a completely different class of antibiotics form the beta- lactams .But they effectively treat many of the same infecations . This includes respiratory,ear,skin and sexually transmitted infecation . So, they are very usefully for people with allergies to beta- lactams .they are also usefully when bacteria develop resistance to beat- lactam antibiotics . How wever ,macrolides have a lot of drug interactions. Be sure your doctor and pharmacist know about all your medications when you take a macrolide.

Common side effects :- Nausea , vomiting , stomach pain , and diarrhea .

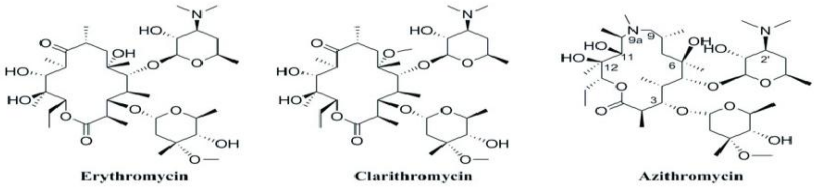
Examples of macrolides :-

Azithromycin

Clarithromycin

Erthromycin

Chemical structure :-



MECHANISM OF ACTION :-

The mechanism of action of macrolides revolves around their ability to bind the bacterial 50S ribosomal subunit causing the cessation of bacterial protein synthesis. Once bound, the drug prevents the translation of mRNA, specifically the growing peptide chain, by preventing the addition of the next amino acid by the tRNA. Since the bacterial ribosomal structure is highly conserved across most, if not all, bacterial species, it is considered to be broad-spectrum. Macrolides are considered to be bacteriostatic as they only inhibit protein synthesis, although, at high doses, hey can be bactericidal.

ROUTES OF ADMINISTRATION

Macrolides come in various forms for administration, depending on the desired medication and reason for their use. Most commonly used are oral formulations in tablet form, but they also come as topical creams, intravenous formulations, as well as ophthalmic preparations.

Erythinromyc

250mg / 500mg – oral tablets

Clarithromycin

125mg / 250mg / 500mg / 1000mg (extended release) – oral tablets

Azithromycin

100mg / 250mg / 500mg / 600mg – oral tablets

FLUOROQUINOLONES

INTRODUCTION

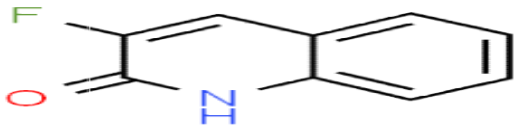
Fluoroquinolones – or quinolones – are active against a very wide variety of bacteria . This makes them useful for treating infection when other antibiotics have failed . They are also an alternative when people have allergies to other antibiotics. They can treat anything from eyeinfection to pneumonia to skin, sinuous, joint, urinary, or gynologics infection or many more. Howhere this class can be a problem for people with certain heart condition and with some other medicines. Be sure your doctor and pharmacist. Known your complete medical history.

- **Common side effects:-**stomach upset or pain**,** diarrhea, headache and drowsiness.

Example of fluoroquinolones

- **Ciprofloxacin**
- **Livofloxacin**
- **Moxifloxacin**

Chemical Structure:- (C9H6FNO)



Mechanism of Action :-

- Fluroquninolones are bactericidal agents .
- They block bacterial DNA synthesis by inhibiting bacterial DNA gyrase and topoisomerase .
- Inhibition of DNA gyrase prevents the relaxation of positively super coiled DNA that is required for normal transcription and replication .

ROUTES OF ADMINISTRATION :-

CIPROFLOXACIN

- Usual duration is 7—14 days .
- Available forms

ORAL	PARENTRAL	OPTHALMIC
100mg	200mg IV	3mg/ml solution
250mg	400mg IV	3.3mg/mg
500mg	.....	ointment

LEVOFLOXACIN

- Usual duration same 7—14 days .
- Available forms

ORAL	PARENTAL	OPTHALMIC
100mg	5mg/ml IV	5mg/ml solution
250mg	25mg/ml IV	.....
500mg	.....	.....

Sulfonamides

INTRODUCTION

Derived from the chemical sulfanilamide, 'sulfa drugs' have been around about as long as penicillin. Technically, sulfonamides don't kill bacteria the way other antibiotics do. Instead, they are bacteriostatic—they stop bacterial growth and your immune system does the rest. They are very good topical treatments for burns and vaginal or eye infections. They can also treat UTIs (urinary tract infections) and traveler's diarrhea. However, resistance is common with this class.**Common side effects**

diarrhea, nausea, rash, and sun sensitivity. Allergies

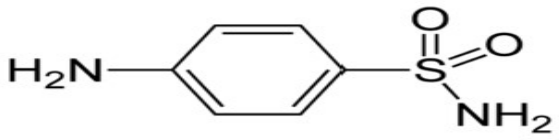
Examples of sulfonamides

Sulfacetamide

Sulfadiazine

Sulfamethoxazole-Trimethoprim

Chemical structure(C6H8N2O2S)



MECHANISM OF ACTION

Sulfanilamide is a competitive inhibitor of bacterial enzyme dihydropteroatesynthetase. This enzyme normally uses para-aminobenzoic acid (PABA) for synthesizing the necessary folic acid. The inhibited reaction is normally necessary in these organisms for the synthesis of folic acid. Without it, bacteria cannot replicate

ROUTESOFADMINISTRATION

For sulfadiazineFor oral dosage form (tablet):For bacterial or protozoalinfections:Adults and teenagers—2 to 4 grams for the first dose, then 1 gram every four to six hours.Children 2 months of age and older—Dose is based on body weight. The usual dose is 75 milligrams (mg) per kilogram (kg) (34 mg per pound) of body weight for the first dose, then 37.5 mg per kg (17 mg per pound) of body weight every six hours, or 25 mg per kg (11.4 mg per pound) of body weight every four hours.Children up to 2 months of age—Use is not recommended.

For sulfamethizoleFor oral dosage form (tablets):For bacterial infections:Adults and teenagers—500 milligrams (mg) to 1 gram every six to eight hours.Children 2 months of age and older—Dose is based on body weight. The usual dose is 7.5 to 11.25 mg per kilogram (kg) (3.4 to 5.1 mg per pound) of body weight every six hours.Children up to 2 months of age—Use is not recommended.

For sulfamethoxazoleFor oral dosage form (tablets):For bacterial or protozoalinfections:Adults and teenagers—2 to 4 grams for the first dose, then 1 to 2 grams every eight to twelve hours.Children 2 months of age and older—Dose is based on body weight. The usual dose is 50 to 60 milligrams (mg)

per kilogram (kg) (22.7 to 27.3 mg per pound) of body weight for the first dose, then 25 to 30 mg per kg (11.4 to 13.6 mg per pound) of body weight every twelve hours.Children up to 2 months of age—Use and dose must be determined by your doctor.

Tetracycline

INTRODUCTION

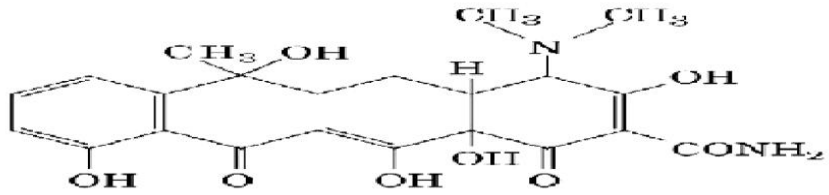
These antibiotics come from a species of bacteria called *Streptomyces*. It seems odd that a bacterium could produce an antibiotic that kills other bacteria, but it's true. Tetracyclines are bacteriostatic, like the sulfonamides. They treat various infections, such as respiratory, skin and genital infections. They also treat unusual infections, including Lyme disease, malaria, anthrax, cholera, and plague. They have noninfectious uses as well, such as treating rosacea.

Common side effects

stomach pain or upset, sun sensitivity, and yeast infections.

Examples of tetracyclines

- Doxycycline
- Minocycline
- Tetracycline



Chemical structure(C22H24N2O8)

MOA

Tetracycline passively diffuses through porin channels in the bacterial membrane and reversibly binds to the 30S ribosomal subunit, preventing binding of tRNA to the mRNA-ribosome complex, and thus interfering with protein synthesis.

CONCLUSION

There is no reason to explain why antibiotic prescribing in infections (the most frequent primary care) is so great. Doctors have to do well and not harm, while respecting the ethical principles of autonomy and justice. However, in the case of ethical conflict, nonmaleficence and justice (at a public and obligatory level) take precedence. We know that we can reduce antibiotic prescribing in many of the infections that are currently unnecessarily treated without compromising our patients' health. By accomplishing this, we will do less harm. Moreover, we know that antibiotics can stop being effective in the short and medium term. The use of the strategies discussed in this paper will help GPs to reduce prescribing of antibiotics. Our duty is to prescribe antibiotics only when they are necessary, i.e. in less than 20% of the infectious seen in primary care.

Rapidly emerging resistant bacteria threaten the extraordinary health benefits that have been achieved with antibiotics. This meta-analysis of current literature shows that patients with uncomplicated diverticulitis can be monitored off antibiotics.

REFERANCE

1. Definition of "infection" from several medical dictionaries – Retrieved on 2012-04-03
2. ^ Sehgal, Mukul; Ladd, Hugh J.; Totapally, Balagangadhar (2020-12-01). "Trends in Epidemiology and Microbiology of Severe Sepsis and Septic Shock in Children". Hospital Pediatrics. 10 (12): 1021–1030. doi:10.1542/hpeds.2020-0174. ISSN 2154-1663. PMID 33208389.
3. ^ GBD 2013 Mortality and Causes of Death, Collaborators (17 December 2014). "Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study". Lancet. 385 (9963): 117–71. doi:10.1016/S0140-6736(14)61682-2. PMC 4340604. PMID 25530442.
4. ^ "Infectious Disease, Internal Medicine". Association of American Medical Colleges. Archived from the original on 2015-02-06. Retrieved 2015-08-20. Infectious disease is the subspecialty of internal medicine dealing with the diagnosis and treatment of communicable diseases of all types, in all organs, and in all ages of patients.
5. ^ "Types of Fungal Diseases". www.cdc.gov. 2019-06-27. Retrieved 2019-12-09.

6. ^ Mada, Pradeep Kumar; Jamil, Radia T.; Alam, Mohammed U. (2019), "Cryptococcus (Cryptococcosis)", StatPearls, StatPearls Publishing, PMID 28613714, retrieved 2019-12-09
7. ^ "About Parasites". www.cdc.gov. 2019-02-25. Retrieved 2019-12-09.
8. ^ Brown, Peter J. (1987). "Microparasites and Macroparasites". Cultural Anthropology. 2 (1): 155–71. doi:10.1525/can.1987.2.1.02a00120. JSTOR 656401.
9. ^ Kayser, Fritz H; Kurt A Bienz; Johannes Eckert; Rolf M Zinkernagel (2005). Medical microbiology. Stuttgart: Georg ThiemeVerlag. p 398. ISBN 978-3-13-131991-3.
10. "Antibiotics". NHS. 5 June 2014. Retrieved 17 January 2015.
11. ^ "Factsheet for experts". European Centre for Disease Prevention and Control. Archived from the original on 21 December 2014. Retrieved 21 December 2014.
12. ^ For example, metronidazole: "Metronidazole". The American Society of Health-System Pharmacists. Retrieved 31 July 2015.
13. ^ Jump up to:[a] [b] Chemical Analysis of Antibiotic Residues in Food. John Wiley & Sons, Inc. 2012. pp. 1–60. ISBN 978-1-4496-1459-1.
14. ^ ou=, c=AU; o=The State of Queensland; ou=Queensland Health (6 May 2017). "Why antibiotics can't be used to treat your cold or flu". www.health.qld.gov.au. Retrieved 13 May 2020.
15. Antibacterial resistance worldwide: causes, challenges and responses. Levy SB, Marshall B. Nat Med. 2004;10:122–129. [PubMed] [Google Scholar].