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Review Article

A REVIEW ON ANTIBIOTIC RESISTANCE

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Abstract

Antibiotics are 'wonder drugs' when it comes to fighting microorganisms. For decades, many antibiotics have been used not only for medicinal purposes but also for preventive use in other industries such as agriculture and livestock. There has certainly been, because microorganisms have become those resistant to conventional antibiotics while the patient is still unaware of emerging resistant. It turns out we have learned that antibiotic resistance is increasing at an alarming rate.A growing list of diseases, ie.pneumonia,tuberculosis and whooping cough, are difficult and sometimes impossible to treat when antibiotics are ineffective Resistance to infections is related to the number of antibiotics used relationships. Microbial resistance is driven by the extrajudicial use of antibiotics. There is a shortage of existing or emerging multidrug-resistant antibiotics, resulting in significant reported morbidity and mortality. This review article further highlights the effectiveness of antimicrobial prophylaxis against human animal health viruses in preventing antimicrobial resistance. Evidence from the literature suggests that knowledge about antibiotic resistance in the population is still low. Therefore, patients and the public should be educated to fight the virus.

Keywords: Antibiotic Resistance, Knowledge , Rational Uses

1. Introduction

Antibiotics, which are cytotoxic to microorganisms that can interfere with the natural defenses of the body, such as the immune system, usually bacterial cytosynthesis, protein synthesis, deoxyribonucleic acid (DNA), ribonucleic acid (RNA), membrane disruptors, or other specific reactions[1]. Antibiotics can also bind to bacteria and penetrate their cell walls, using a kind of energy-dependent transport at ribosomal sites, leading to subsequent inhibition of protein synthesis[2].

Antibiotics are undoubtedly a boon for human civilization to combat diseases or microorganisms that have saved millions of lives. Over time, antibiotics have been used repeatedly for treatment. Antibiotics were seen as a 'wonder drug'.In the mid-20th century.At that time there was a healthy belief that infectious disease was almost completely stopped. The beginnings of modern "antibiotics" were analogously associated with the names of Alexander Fleming and Paul Ehrlich.Antibiotics were seen as a magic bullet that selectively targeted the infectious microorganisms, but at the same time didn't affect the patient.Thus, the period from 1950

to 1970 was considered a golden age when new antibiotics were discovered[3].

The high demand for antibiotics in many settings leads to the use of cheaper, off-label medications. On the contrary, due to the extensive and irresponsible use of antibiotics, it greatly contributed to the emergence of antibiotics.In the early days, new antibiotics pathogen production is directly proportional to antibiotic production. However, the current mainstream strategy is focused on modifying existing antibiotic regimens to combat the emergence and re-emergence of resistant pathogens worldwide[4].

This problem develops over a relatively short period of time and therefore, is a major concern. With technological advances, many people are now aware of the negative effects of resistance to available pesticides but very few take active steps to prevent infection by not overusing antibiotics so[8]. Almost all antibiotics in developing countries are available over the counter Educating patients and the general public will be the only way to overcome resistance[5].

The study is one such approach to educate the public by identifying progress in antibiotic resistance and a reasonable future with existing regulations to reduce the harm of drugs that reduce resistance in human body.

Following are a few pros and cons of taking antibiotics:

1.1 Pros of Taking Antibiotics

- Antibiotics can slow the growth of and kill many types of infection.
- In some cases, such as before surgery, antibiotics can prevent infection from occurring.
- Antibiotics are fast-acting; some will begin working within a few hours.
- They are easy to take: Most antibiotics are oral medications. Your doctor may decide to give you an injection, if it is imperative that the medicine gets into your system quickly.

1.2 Cons of Taking Antibiotics

- If you take antibiotics often, your body can build a resistance to antibiotic drugs, which could cause antibiotics to become less effective.
- The longer the course of treatment for an antibiotic, the more damage that can be done to the body's immune system.
- Some antibiotics can have side effects, from digestive issues to bone damage to sensitivity to sunlight. Make sure to read the fine print that comes with your medicine, so that you know the risks[6].

"By taking antibiotics when we do not need them, we increase the chances of bacteria becoming resistant to the medication and then, when we really need it, those antibiotics will not be effective. This can lead to an increase in hospitalizations, due to the need for IV antibiotics, or even increased chances of death".

1.3 Regulatory Issues of Antibiotics

Recently, two characteristics of antibiotics prescribing—that is, use of doses that are too small or treatments that are too long—have been shown to increase the risk of selection of resistance. The ecological impact of poor compliance or of the use of highly selective agents remains to be established.

1.4 Origin of Antibiotic Resistance

This has been observed to occur when a drug loses its ability to effectively inhibit bacterial growth. Bacteria are 'stable' and multiply in the presence of therapeutic antibiotics.Bacteria are also said to be resistant bacteria as they replicate in the presence of antibiotics.

Antibiotics are usually effective on their own, but antibiotic resistance has been observed when new antibiotics are administered that require higher than normal doses of the same drug its potency when the microorganisms are not weak or resistant occurred.

This could be a natural selection where nature provides the lowest resistance to all viruses. For example, one study confirmed that sulfamethoxazole,

trimethoprim (TMP-SMZ), ampicillin and tetracycline were once commonly used, but currently have no role in the treatment of benign fever in Thailand Simultaneously same another study conducted in Bangladesh showed that similar drugs effective It is effective in the treatment efficacy. In fact, its antibacterial properties were documented even before the advent of antibiotics Methicillin, introduced in 1961, was the first of the semi-synthetic penicillinase-resistant penicillins to target penicillinase-producing Staphylococcus aureus but resistance was soon reported in the post-methicillin era in thereafter, although the introduction of fluoroquinolones in Gram disease in the 1980s resulted in - poor bacterial Later, resistance to fluoroquinolones suggested that these drugs are also used to treat Gram-positive infections Quinolone chromosome mu mutation resistance, especially in methicillin-resistant compounds. More recently, a vancomycin-resistant Staphylococcus aureus (VRSA) isolate was obtained in 2002, 44 years after vancomycin appeared on the market[7].

Antibiotics used in agriculture are often the same or similar to antibiotics used in hospitals, this overuse can also invite drugs resistance The food chain can be considered as a major route for the transfer of antibiotics between livestock groups In some developed countries, animals are exposed to antibiotics in their feed, urine, or their in which may be responsible for transmitting microorganisms resistant to those particular antibiotics For example, antibiotics used in animal feed as growth factors provide resistance to antibiotics is high[8].

1.5 Development of Antibiotic Resistance

Antibiotics fight bacteria. Thus, bacteria have a natural anti-inflammatory component. Mutations in genes lead to different resistance mechanisms. Antibiotics induce selective pressure and genes are associated with selective pressure. Bacteria have a tendency to transfer genes directly to each other through plasmid transfer, suggesting that natural selection is not the only form of resistance Antibiotics have been documented as common in hospitals as a clinical prophylaxis but an immune booster[9].

These are usually effective in killing most bacteria in the colony. However, there is a distinct group of genetically modified bacteria that can confer resistance. The number of antibiotic-resistant infections was found to be significantly associated with antibiotic consumption. It can also be resistant if users do not take all prescribed antibiotics. Subsequently, the bacteria become more resistant to antibiotics and become untouchable. Bacteria can accumulate resistance to a wide range of infections over time and are resistant to a wide range of antibiotics[10].

For instance, ineffective transport of aminoglycosides, chromosomal abnormalities, and enzyme alterations have all been linked to staphylococci resistance. Antibiotics have the ability to select for more than just drug resistance. Drugs of the same class that share structural similarities may be antagonistic to one another. Tetracycline resistance, for instance, might result in resistance to minocycline, oxytetracycline, chlortetracycline, and doxycycline .Resistance genes in the antibiotics provided protection against their own antibiotics, and these genes' antibiotic activity evolved long before the antibiotics started to show therapeutic effects[11].

2. The Mechanism of Drug Resistance of Common Antibiotics

2.1 Beta-Lactams Mechansim of Action

The mechanism of action of beta-lactam antibiotics involves irreversibly inhibiting bacterial cell wall synthesis by binding to transpeptidase enzymes (penicillin-binding proteins) that bind to protective peptidoglycan loops.

2.2 Beta -Lactams the Mechanism of Drug Resistance

Resistance to β-lactam antibiotics usually involves the production of β-lactamases that hydrolyze the β-lactam ring, mutations in penicillin-binding proteins (PBPs), or compounds that killing bacterial entry is decreased by altered porin pathways or efflux pump overexpression.

2.3 Aminoglycosides Mechanism of Action

Aminoglycosides exert bactericidal effects by irreversibly binding to the viral ribosome, resulting in mistranslation of mRNA, inhibition of protein synthesis, and ultimately bacterial cell death.

2.5 Aminoglycosides the Mechanism of Drug Resistance

Aminoglycoside resistance generally requires enzymes that metabolize the drug through aminoglycoside-modifying enzymes, drug reduction through changes in viral membrane permeability or overexpression of an efflux pump, and mutations in the viral ribosomal targeting site.

2.6 Glycopeptides Mechanism of Action

Glycopeptides inhibit bacterial cell wall synthesis by binding to the D-alanyl-D-alanine terminus of the precursor peptidoglycan, thus preventing cross-linking and inducing cell wall degradation and bacterial death

2.7 Glycopeptides the Mechanism of Drug Resistance

Resistance to glycopeptides generally requires genes encoding early cell wall mutations with decreased affinity for antioxidants, such as D-alanyl-D-lactate or D -alanyl-D-serine instead of D-alanyl-D-serine, antibiotic binding Also reduced effectiveness.

2.8 Tetracyclinesmechansim of Action

Tetracyclines inhibit viral protein synthesis by binding to the 30S subunit of the viral ribosome, inhibiting aminoacyl-tRNA binding and inhibiting peptide expression.

2.9 Tetracyclines the Mechanism of Drug Resistance

Tetracycline resistance typically involves efflux pumps that actively remove antibiotics from bacterial cells, ribosome-protecting proteins that prevent tetracycline from entering the ribosome, or enzymatic ait inactivates tetracycline through specific enzyme inhibition Macrolides mechansim of action.

2.10 Macrolides Mechanism of Action

The macrolide inhibits viral protein synthesis by binding to the 50S ribosomal subunit, thus preventing movement of peptide tRNA from the receptor to the donor site.

2.11 Macrolides the Mechanism of Drug Resistance

Macrolide resistance usually results from efflux pumps that remove the antibiotic from bacterial cells, modification of ribosomal target sites, such as methylase-mediated methylation of 23S rRNA, or enzymatic inactivation of the drug by macrolide esterases.

2.12 Lincosamides Mechanism of Action

Lincosamide binds to the 50S ribosomal subunit and inhibits viral protein synthesis, preventing the formation of peptide bonds.

2.13 Lincosamides the Mechanism of Drug Resistance

Lincosamide resistance generally requires enzymatic inactivation of the drug by lincosamide nucleotidyl transferase, as well as mutations or modifications of ribosomal target sites, which reduce drug binding and activity on.

2.14 Streptogramins Mechanism of Action

Streptogramins inhibit viral protein synthesis by binding to the 50S ribosomal subunit, resulting in premature release of incomplete polypeptides and inhibition of viral growth.

2.15 Streptogramins the Mechanism of Drug Resistance

Streptogramin resistance generally involves modification or inactivation of the drug by enzymes that metabolize streptogramin, as well as mutations in ribosomal target sites, which reduce drug binding and synthesis on the job.

2.16 Oxazolidinones Mechanism of Action

Oxazolidinones inhibit viral protein synthesis by binding to the 50S ribosomal subunit initiation complex, thereby preventing 70S initiation complex activation and subsequent translation formation.

2.17 Oxazolidinones the Mechanism of Drug

Resistance

Oxazolidinone resistance generally involves mutations in ribosomal target regions, particularly the 23S rRNAgene, which reduce drug binding affinity and efficacy on.

2.18 Phenicols Mechanism of Action

Phenicols inhibit bacterial protein synthesis by binding to the 50S ribosomal subunit, inhibiting peptidyl transferase action, and inhibiting peptide expression.

2.19 Phenicols the Mechanism of Drug Resistance

Phenicol resistance usually results from enzymatic inactivation of the drug by chloramphenicol acetyltransferase or by decreased drug absorption or overexpression of efflux pumps by mutations affecting porin proteins.

2.20 Quinolones Mechansim of Action

Quinolones inhibit bacterial DNA gyrase/ topoisomerase, preventing DNA supercoiling and DNA fragmentation, and ultimately leading to bacterial cell death.

2.21 Quinolones the Mechanism of Drug Resistance

Quinolone resistance is usually caused by mutations in genes encoding DNA gyrase/topoisomerase or efflux pump systems, and plasmid-mediated quinolone resistance determinants, which together reduce drugs binding to or enhancing drug release from bacterial cells.

3. Consequence of Antibiotic Resistance

Superbugs are germs that are resistant to antibiotics. These now pose a worldwide risk because to their high death rate and potentially fatal morbidity, in addition to being a laboratory problem . These illnesses have serious repercussions in unstable environments such civil unrest, violence, starvation, and natural calamities. The World Health Organisation (WHO) cautions that if we combat antibiotic resistance, using antibiotics later on may result in more infections and minor injuries that could potentially result in death. Now let's get to work. Worldwide mortality from drug-resistant microorganisms is on the rise.

The clonal wave of nosocomial Staphylococcus aureus (S. Aureus) infection is a problem for many countries. Methicillin-resistant Staphylococcus aureus (MRSA) is spreading rapidly worldwide. Multidrug resistance results in high health costs and loss of productivity For most physicians who prescribe antibiotics that would otherwise be ineffective well and without legal consent has become commonplace[12].

Evidence suggests that high-dose antibiotics can a positive association with high levels of resistance has been found, whereas antibiotic use appears to decrease low levels of resistance.

4. Regulatory Issues Related to Antibiotic Resistance

Consistent guidelines for the daily use of antibiotics are still lacking. Thus, legal guidelines vary from country to country. Some countries have affected promptly by issuing directives, such as the United Kingdom, while other countries have not yet taken the initiative. WHO has be used to treat severe hemorrhagic fever and cholera. Since technological the transition began, we have dumped increasing amounts of organic and inorganic toxins into rivers, streams,ocean, land and air There are no adequate guidelines that may pose a higher risk of resistance because these products contain large amounts of antibiotics[13].

With so much evidence available, there is no way to ignore global antibiotic resistance. Antibiotic resistance may be more common in areas where antibiotics are prevalent. Lack of regulation and control over antibiotic use is a priority, and global control should be targeted. The use of antibiotics is not fully regulated in countries where there is no universal health coverage for its citizens[14].

We need to take the necessary steps to address this complex challenge. Social skills, motivation, commitment to areas of responsibility and strict rules and regulations should be given priority.

Additionally, we need an integrated action for better antibiotic use, better management strategies.

Currently, Staphylococcus aureusbacterium is dangerous because of its high antibiotic resistance. Because of its strong history of close association with humans. These factors lead to increased human resistance leading to immediate threats to human health. Strict enforcement laws are needed to deal with harmful waves in the agricultural industry[15].

Treatment of bacterialdiseases is increasing day by day. As antibiotic resistance develops, diseases persist; Effective new drugs that are effective without known bacterial resistance are increasingly sought after. New therapeutic strategies to combat infections are being considered[16]. Administration of inactivated vaccines or non-neutralizing antibodies has been found to be effective in preventing viral infections.Several new antibiotics are in development for clinical trials to combat antibiotic resistance. Interventional strategies target not only targets but also biological networks to aid in the development of new antimicrobial therapies. Combination therapy combining antibiotics and antibiotic-producing phages has shown promising antimicrobial potential[17].

5. Importance of Antibiotics

Antibiotics are medicines that fight infections caused by bacteria in humans and animals by either killing the bacteria or making it difficult for the bacteria to grow and multiply. Bacteria are germs. They live in the environment and all over the inside and outside of our bodies. Antibiotics are medications used to treat bacterial infections[18]. They were a major advancement in health care and significantly reduced mortality from illnesses when they were first approved. They're typically only used for a short period. If prescribed an antibiotic, it's important to take the entire regimen. This is likely the only way to ensure all the bacteria causing the infection are killed. It's also the best chance of keeping the infection from coming back. If you start to feel better, that's a good sign the antibiotic is working[19]. However, that doesn't mean you're in the clear. This should not be a sign to stop taking the antibiotic as prescribed. If enough of the bacteria causing the infection are still living, the infection can come back very quickly creating a need for more antibiotics. Some people can develop antibiotic resistance which is caused by bacteria building a resistance to the first antibiotic. It will not work the second time around. This can make it increasingly difficult for medical professionals to treat the infection. Proper use of antibiotics can save lives, but when they're improperly used, they can cause serious side effects and harm[20-24].

6. Conclusions

Antibiotic resistance is consistently high in all regions of the world. Despite some policies adopted by some WHO countries, the use of antibiotics in humans, animals and agriculture is increasing. The enormous financial burden of the healthcare industry has become a hot topic, leading to prolonged hospital stays, isolated facilities, strict infection control measures and failed treatment if public health leaders pan national and international cooperation -Precautions, consistent surveillance and mandatory reporting of antibiotic resistance should be established .Both domestic and global policies need to be traditional and monitorable to stop the overuse and misuse of antibiotics. Antibiotics must be used wisely and sparingly, and farmers, physicians and the general public must all recognize the importance of this valuable resource. Antibiotics have many uses in livestock. They are used to treat active infections, prophylactically to prevent infections, or even as growth promoters.

Conflict of Interest: None

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