DOI: https://doi.org/10.36094/sc.v89.2024.Antibiotic_or_No_Antibiotic.Chakraborty_Dogra_Gupta.468

ARTICLE

Sci. and Cult. 90 (11–12) : 468-471 (2024)

ANTIBIOTIC OR NO ANTIBIOTIC; MYTHS AROUND MEDICINE

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Antimicrobials are medicines used to treat infections caused by various microorganisms. Antibacterials, or antibiotics target bacteria; antivirals target viruses; antifungals target fungi; and antiparasitics target parasites, Antibiotics can be classified into three main types: narrow-spectrum, broad-spectrum, and extended-spectrum. Antimicrobial Resistance (AMR) occurs when microbes develop mechanisms to evade the antimicrobials and rendering them ineffective. In countries like India, the situation is worsened by irrational antibiotic prescriptions, over-the-counter availability, and self-medication without a prescription. Addressing AMR requires a multi-faceted approach. Governments, healthcare providers, and the public must work together to promote the rational use of antibiotics. This includes implementing stringent regulations on the sale and use of antibiotics, promoting antimicrobial stewardship programs, and investing in research and development of new antibiotics and alternative therapies. There are many misconceptions about antibiotic use. Most of us believe antibiotics are a cure-all for any illness, that it's safe to stop taking antibiotics as soon as you feel better, or that antibiotics can be used without a prescription. These myths contribute to the misuse of antibiotics and the rise of superbugs. We can do much more than we think. Practicing healthy habits such as proper hand washing, regular vaccination, timely doctor visits, and eating a nutritious diet can help prevent infections. When we do get sick, it's crucial to follow the doctor's prescription carefully, complete the full course of antibiotics, and avoid self-medication.

Microbes—tiny organisms like bacteria, viruses, fungi, and parasites—are all around us and can sometimes make us sick. To combat bacterial infections, doctors often prescribe antibiotics. For infections caused by fungi and parasites, there are specific antifungal and antiparasitic drugs. But what happens if these medications don't work? This scenario can be deadly, and with the rise of superbugs, it's a growing concern. Superbugs are strains of bacteria, viruses, fungi, and parasites that have become resistant to most commonly used antimicrobials and other medications. These resistant bacteria can cause serious infections, such as pneumonia and infections of the blood, skin, and urinary tract, that are difficult to treat. (Figure 1)

Antimicrobials are medicines used to treat infections caused by various microorganisms. Antibacterials, or antibiotics target bacteria; antivirals target viruses; antifungals target fungi; and antiparasitics target parasites[1]. The first antibiotic, penicillin, was discovered in 1928 by Scottish bacteriologist Alexander Fleming. He noticed that a mold called Penicillium notatum inhibited bacterial growth on a culture plate[2]. Deacades after, scientists like Ernst Chain and Howard Florey isolated penicillin and demonstrated its effectiveness against many serious bacterial infections[3]. Antibiotics can be classified into three main types: narrow-spectrum, broad-spectrum, and extended-spectrum. Narrow-spectrum antibiotics, such as

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penicillin G, are effective mainly against gram-positive bacteria. Broad-spectrum antibiotics, such as cephalosporins and fluoroquinolones, are effective against both gram-positive and some gram-negative bacteria. Extended-spectrum antibiotics are effective against additional gram-negative bacteria. The classification into gram-positive or gram-negative depends on the thickness of their peptidoglycan cell wall[4].

Antimicrobial resistance (AMR) is a global threat that significantly affects infectious disease outcomes and healthcare costs. Alexander Fleming, the discoverer of antibiotics, warned about AMR in his 1945 Nobel lecture, emphasizing the dangers of indiscriminate antibiotic use[5]. (Fig. 2) In countries like India, the situation is worsened by irrational antibiotic prescriptions, over-the-counter availability, and self-medication without a prescription[6]. Antibiotics are often prescribed for minor illnesses due to social pressures and the lack of antimicrobial stewardship program in many hospitals. The rise of AMR is not just a healthcare issue but also an economic one. The cost of treating resistant infections is significantly higher than treating non-resistant infections. This is due to longer hospital stays, the need for more expensive drugs, and the requirement for more intensive care[7]. The World Health Organization (WHO) estimates that AMR could cause 10 million deaths per year by 2050[8] and a cumulative loss of USD 1.2 trillion to the global economy[9].

One of the most significant drivers of AMR is the misuse and overuse of antibiotics in both human medicine and agriculture. In many parts of the world, antibiotics can be purchased without a prescription, leading to widespread misuse. In agriculture, antibiotics are often used to promote growth in healthy animals, which contributes to the development of resistant bacteria that can be transmitted to humans through the food supply[10]. Addressing AMR requires a multi-faceted approach. Governments, healthcare providers, and the public must work together to promote the rational use of antibiotics. This includes implementing stringent regulations on the sale and use of antibiotics, promoting antimicrobial stewardship programs, and investing in research and development of new antibiotics and alternative therapies.

Antimicrobial stewardship programs (ASPs) are designed to optimize the use of antibiotics, reduce the incidence of AMR, and improve patient outcomes. Antimicrobial Stewardship is about developing a system in any hospitals to conduct regular activities to optimize the use of antimicrobials, thus minimizing the resistance. This program involves guidelines for the appropriate use of antibiotics, education for healthcare providers and patients, and monitoring of antibiotic use and resistance patterns. ASPs have been shown to reduce the use of antibiotics, improve patient outcomes, and reduce healthcare costs. Public awareness and education are also crucial in the fight against AMR[11] Many people are unaware of the dangers of antibiotic misuse and the importance of following prescribed treatments. Public health campaigns can educate the public on the proper use of antibiotics, the risks of self-medication, and the importance of completing prescribed antibiotic courses.

We have more control than we think. Practicing healthy habits such as proper hand washing, regular vaccination, timely doctor visits, and eating a nutritious diet can help prevent infections. When we do get sick, it's crucial to follow the doctor's prescription carefully, complete the full course of antibiotics, and avoid self-medication. (Fig. 3)

There are many misconceptions about antibiotic use. Some people believe antibiotics are a cure-all for any illness, that it's safe to stop taking antibiotics as soon as you feel better, or that antibiotics can be used without a prescription. These myths contribute to the misuse of antibiotics and the rise of superbugs. (Fig. 4)

The rational use of antibiotics involves prescribing them with the right indication, dosage, route, and duration. While doctors aim to relieve symptoms quickly, overuse of antibiotics can lead to a future where no antibiotics are effective against bacteria. The last decade has seen a decline in the development of new antibiotics, leading to what's called the 'Antibiotic Void' era. It's essential to use existing antibiotics judiciously and implement Antibiotic Stewardship programs at all levels of the healthcare system to combat AMR and ensure future generations can treat infectious diseases effectively1[2,13]

Innovation in the development of new antibiotics and alternative treatments is also essential. The pharmaceutical industry has been slow to develop new antibiotics due to the high costs and low returns on investment. However, governments and international organizations are now providing incentives for the development of new antibiotics and alternative treatments, such as bacteriophages, which are viruses that infect and kill bacteria[14].

In conclusion, the prudent use of antibiotics should always be emphasized. This means not only understanding when and how to use antibiotics but also promoting

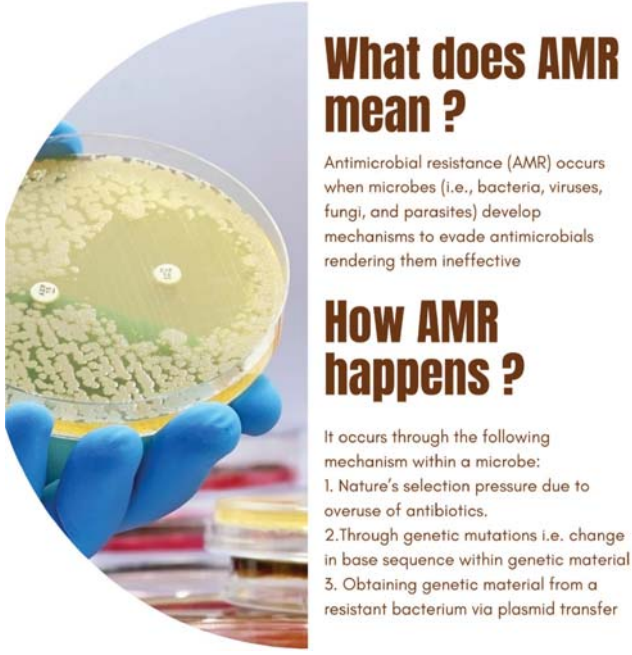

Fig. 1: Basic Concepts about AMR:

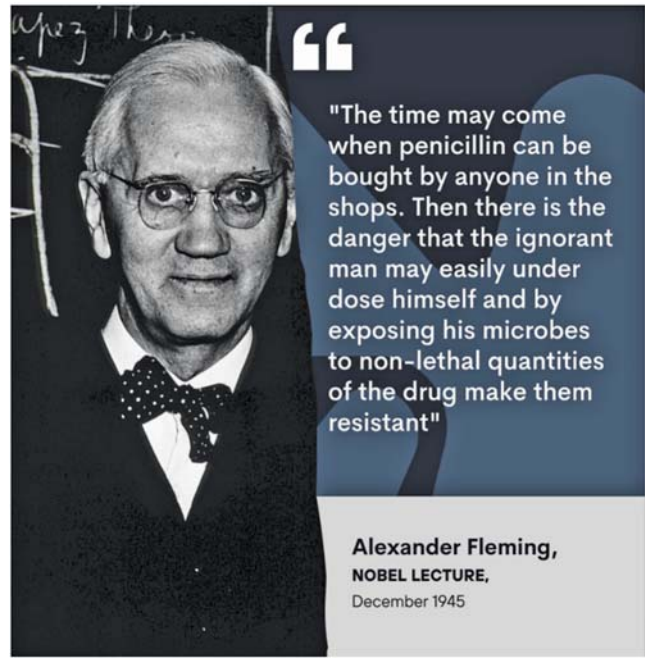

Fig. 2: Prediction from the discoverer himself

Fig. 3: What is in our hand

Fig. 4: Myth vs Facts

prevention through healthy habits. We need to preserve the effectiveness of antibiotics by using them scientifically and judiciously. By doing so, we can combat the menace of antimicrobial resistance and ensure that we have the resources to treat and cure infectious diseases in the future. Governments, healthcare providers, and the public must work together to implement strategies to combat AMR and promote the rational use of antibiotics. This will require investment in research, public education, and the implementation of antimicrobial stewardship programs. Only through a concerted global effort can we hope to mitigate the threat of AMR and safeguard the health of future generations. ❒

Bottom-line: PREVENT & PREPARE instead of REPENT & REPAIR

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