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A REVIEW ON "ANTIBIOTIC RESISTANCE: A GLOBAL THREAT"

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ABSTRACT
Antibiotics are a vital weapon for fighting bacterial infections from several decades. Numbers of antibiotics are not used therapeutically and clinically due to their resistance. Nowadays many bacteria have become resistant to common clinically used antibiotics. Uncertainty has arisen, as microbes have become resistant to common antibiotics while the host remains unaware that antibiotic resistance has emerged. The aim of this review is to explore the origin, development, and the current state of antibiotic resistance, regulation, and challenges by examining available literature. We found that antibiotic resistance is increasing at an alarming rate. A growing list of infections i.e., pneumonia, tuberculosis, and gonorrhea are becoming harder and at times impossible to treat while antibiotics are becoming less effective. Antibiotic-resistant infections correlate with the level of antibiotic consumption. Non-judicial use of antibiotics is mostly responsible for making the microbes resistant. The bacteria with multiple drug resistance have limited treatment and also are difficult to treat which may cause patient death.

KEYWORDS: Antibiotic resistance, Antibiotic use and awareness.

INTRODUCTION

The role of antibiotic in worldwide is having a vital role. The antibiotic having a major role from the past 8 decades. Antibiotics show revolutionary treatment against infectious disease.[1] Antibiotic having serious concern for human and animal health. There are many drug regulatory authorities and government health ministries of various countries put glimpse on antibiotic resistance. Now a day serious and worsen challenge in a worldwide. 20 years ago physician found that the antimicrobial having a global resistance, especially in Asia, Africa, Europe regions. There are two main bodies, national antimicrobial resistance monitoring system (USA) and Danish integrated antimicrobial resistance monitoring and research program. DANMAP discussed in 2006 for 14 years period of the trends in the antimicrobial resistance among foodborne pathogens salmonella typhi, paratyphi, campylobacter jejuni that are large of animal origin.

Drug resistance stain firstly initial or appear in hospitals where most antibiotics are used, sulphonamide resistance in streptococcus pathogen emerge in the military hospital in 1930, penicillin resistance in staphylococcus found in a London, mycobacterium tuberculosis with resistance to streptomycin emerge in the community soon after the discovery of the antibiotics.

In 1950-1960 there is a number of bacteria show antimicrobial resistance such as Escherichia coli, Shigella, salmonella. Haemophilus influenza and Neisseria gonorrhea organisms that lead respiratory and genitourinary diseases and their bacteria show resistance to ampicillin, chloramphenicol, tetracycline.[2] On antimicrobial resistance, there are several worldwide institutes having a surveillance system such as WHO, the European country for disease prevention and control and develop protocol of antimicrobial medicine consumption. At this stage 16 countries were able to share their national data with WHO. Other countries currently processing data collection and validation of the consumption of antibiotics. In most countries amoxicillin and amoxicillin with clavulanic acid where more frequently consume antibiotics. This substance belongs to access category of other model lists of essential medicine (WHO report 2016-2018)

In 49 countries broad-spectrum antibiotics such as third-generation cephalosporin, quinolone, carbapenems use with precautions because of their high potential to cause the development of antimicrobial resistance. The antibiotics are having a major role in treatment of bacterial infections by the mechanism of cell wall synthesis, synthesis of proteins, DNA, RNA, and other specific action. The number of newer classes of antibiotics has been produced in last 60 years since its inception but the enormous and irresponsible use of antibiotics gives the resistance against bacteria. Increased demand for antibiotics in market these are available at low cost without prescription and the less knowledge regarding the use of antibiotics is responsible for the resistance of antibiotics in bacteria.[3]

How does antibiotic resistance develop?

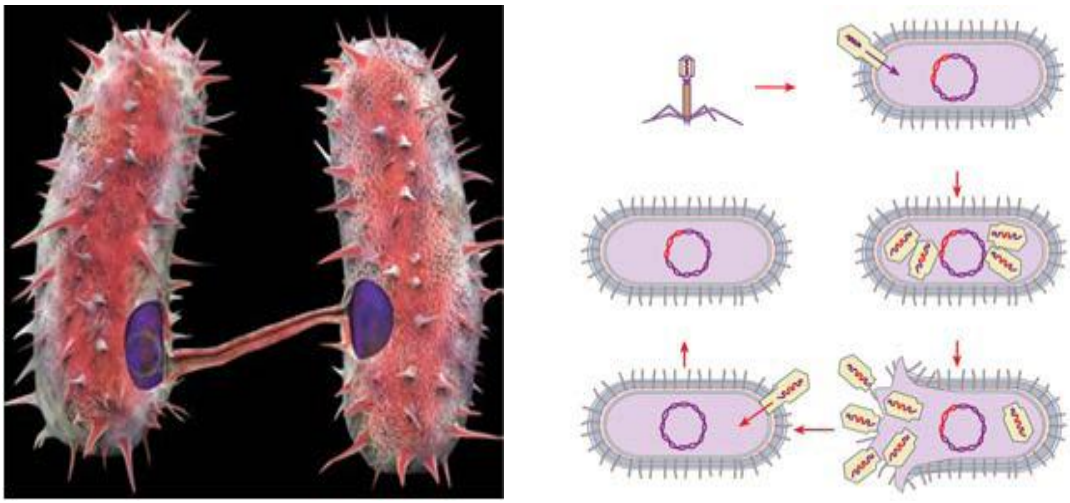
The first antibiotic resistance was reported to penicillin in 1940 with R staphylococcus. Antibiotic resistance is nothing but when bacteria replicate in the presence of antibiotics. Antibiotic resistance can occur through mutations, the result of mistakes when bacteria copy their DNA as they divide mutation is allowing bacteria to survive in treatment of antibiotics.

The bacteria which shows resistance to antibiotics apart from mutation are as follows:

Antibiotics	Expected mechanism of action	Method of resistance
Ampicillin	Inhibit cell wall synthesis	Production of beta-lactamase
Tetracycline	Protein synthesis	Active efflux from the cell
Chloramphenicol	Protein synthesis	Reduce uptake into cell
Beta-lactams, erythromycin, lincomycin	Inhibit the cell wall synthesis	Enzymatic cleavage or modification to an inactive antibiotic molecule

Antibiotic resistance is encoded in the DNA of bacteria, on one or more genes. For example, a gene may control whether the bacterium produces a chemical that destroys antibiotic molecules. Plasmids, circular chunks of bacterial DNA that exist naturally inside many bacterial cells, may contain genes that confer antibiotic resistance. In addition to reproduction, plasmids can move between individual bacterial cells in several different ways.[4]

- When two bacteria are near each other, genetic material can be passed directly between cells, or via a hollow structure called a pilus, or a pore, that can form between the two cells. Plasmids can use this pilus like a bridge, sending copies of them from one cell to the other. DNA sequences that can move from one location on a genome to another (known as transposons) can pass through the pore from one cell to another (this process is known as conjugation).
- Transformation of genetic material occurs when a bacterium dies, at which point it breaks up and releases its DNA into its environment. Nearby bacteria can pick up bits of this free-floating DNA and integrate it into their own genomes, creating a potential pathway for antibiotic resistance dissemination.
- Transduction occurs when a virus attacks a bacterium and takes over the cell to make copies of it. Sometimes, bits of bacterial DNA is included in the DNA of the virus particles produced. The viruses then carry these chunks of bacterial DNA to other bacteria they infect.[5]



(A) (B)

Fig: A. Process of conjugation B. Process of transduction.

CONCLUSION

Antibiotic resistance is highly equipped in all parts of the world. Despite measures taken by all the regulatory authorities regarding widely increasing use of antibiotics clinically in humans, animals and agriculture. A better understanding of mechanism of antibiotic resistance which helps physician regarding use of antibiotics in different situation. The government of all countries should establish surveillance for the misuse of antibiotics which leads to reduce mortality.

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