EDITORIAL

Antimicrobial Resistance – A Global Threat

Saleem Hafiz and Sana Jamil

Despite his chance extraction of penicillin, Fleming has been known to have foreseen the potential of antibiotic misuse. "The ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug, makes them resistant".

Antimicrobial resistance reduces the options and effectiveness of anti-infective therapy; the emergence of resistance is a natural phenomenon which can be promoted by the use of anti-infective medicines in certain circumstances. The evolution of antimicrobial resistance is greatly accelerated when anti-infective agents are used inappropriately.

Antibiotics have long been considered the "magic bullet" that would end infectious diseases. Although they have improved the health of countless numbers of humans and animals, many antimicrobials have also been losing their effectiveness since the beginning of the antimicrobial era. Microorganisms have adapted defences against these antibiotics and continue to develop new resistances, even as new antimicrobials are developed. In recent years, much attention has been given to the increase in antibiotic resistance. As more microbial species and strains become resistant, many diseases have become difficult to treat, a phenomenon frequently ascribed to both indiscriminate and inappropriate use of antibiotics in human medicine. However, the use of antibiotics and antimicrobials in raising food animals has also contributed significantly to the pool of antimicrobial resistant organisms globally and resistant bacteria are now found in large numbers in virtually every ecosystem on earth.

There is no doubt that the use of antibiotics provides selective pressure that results in antimicrobial resistant bacteria and resistance genes. While some resistant bacteria are found naturally in the environment, pathogens and non-pathogens are released into the environment in several ways, contributing to a web of resistance that includes humans, animals, and the environment, essentially the biosphere.[1]

Department of Microbiology, Sindh Institute of Urology and Transplantation (SIUT), Karachi.

Correspondence: Prof. Saleem Hafiz, Department of Microbiology, Sindh Institute of Urology and Transplantation (SIUT), Karachi.
E-mail: drshafiz@gmail.com

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The interest in antimicrobial therapy dates back to the times when it was known that microorganisms are responsible for diseases.[1] Egyptians and Greeks used plant extracts successfully to treat diseases. Malaria was treated with extract of cinchona bark (quinine) and amoebic dysentery with "ipecacuanha" root (emetine).[2,3]

The discovery of penicillin in 1928 by Alexander Fleming,[4] laid the foundation of modern antimicrobial therapy, but it is interesting to note that Fleming overlooked the resistance mechanism of the organisms he tested. Microorganisms isolated before penicillin era had the ability to produce beta lactamase.[5]

Since the discovery of penicillin, a number of new antibiotics were discovered and modified in the labs to introduce new antimicrobial agents, but it is interesting to note that no sooner newer antimicrobials were introduced, microorganism acquired mechanisms to counteract these products. The resistant genes can spread far wider than once believed and a pool of resistance develops in the non-pathogens which may act as a source for pathogens to acquire resistant genes.

Antimicrobial usage in human, animal and agriculture leads to resistance in the environment via discharge of domestic sewage, hospital waste water, and in dustrial pollution. Much more antimicrobials are used in animals as compared to human beings. In Denmark in 1994, a total of only 24 kgs of vancomycin was used to treat infections in humans versus 24,000 kgs for animals.[6]

Once resistant organisms are into the environment, they pose a health risk if they colonize or spread resistance genes to bacteria that colonize humans. We are not very far from the era in which antimicrobials will become ineffective if we do not control the usage of antimicrobials in industry, agriculture, poultry, improve the water and sewerage system, and make judicious use of antimicrobials in community and hospitals.

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