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Opinion Article

Overview of Antibiotic Resistance in Bacteria and Virus

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DESCRIPTION

Antimicrobials are drugs used to prevent and treat infections in humans, animals, and plants. Antibiotics, antivirals, antifungals, and antiparasitics are among them. Among these include antibiotics, antivirals, antifungals, and antiparasitics. When bacteria, viruses, fungi, and parasites mutate to the point where they no longer react to antibiotics, infections become more difficult to treat. Eventually the risk of disease spread, severe illness, and death increases. Drug resistance renders antibiotics and other antimicrobial treatments ineffective, and infections grow increasingly difficult or impossible to treat. The emergence and spread of drug-resistant bacteria with novel resistance mechanisms, resulting in antimicrobial resistance, continue to jeopardize our capacity to treat common diseases. Antibiotic resistance is frequent in common bacterial disorders such as urinary tract infections, sepsis, sexually transmitted infections, and many types of diarrhea. They've been reported all around the world, indicating that we're quickly running out of viable drugs. In countries reporting to the global antimicrobial resistance and use surveillance system, resistance to ciprofloxacin, an antibiotic commonly used to treat urinary tract infections, ranged from 8.4 percent to 92. 9 percent, and in *klebsiella pneumoniae*, resistance ranged from 4.1 percent to 79.4 percent.

Klebsiella pneumoniae are common gut bacteria that can cause potentially fatal infections. *K. pneumoniae* resistance to last-resort therapy (carbapenem antibiotics) has developed throughout the world. *K. pneumoniae* is a leading source of hospital-acquired infections such as pneumonia, bloodstream infections, neonatal infections, and intensive-care unit infections. Because of resistance, carbapenem medicines do not function in more than half of the patients treated for *K. pneumoniae* infections in various countries. Resistance to fluoroquinolone antibiotics, which are used to treat urinary tract infections, is prevalent in *E. coli*. This medication is currently unsuccessful in more than half of patients in various countries throughout the world. Colistin is the sole medication available as a last option for life-threatening infections caused by carbapenem-resistant Enterobacteriaceae (*E.coli, Klebsiella*). Bacteria resistant to colistin have also been found in several nations and areas, producing diseases for which there is now no effective antibiotic therapy. *Staphylococcus aureus* bacteria are found in human skin and are a major source of infection in both the community and healthcare environments. Resistance to *N. gonorrhea* in exceedingly diverse strains has compromised gonorrhea therapy and control. Resistance to sulphonamides, penicillins, tetracyclines, macrolides, fluoroquinolones, and first-generation cephalosporins has spread quickly. In most countries, the injectable Extended-Spectrum Cephalosporin (ESC) ceftriaxone is the only surviving empiric therapy for gonorrhea. Antibiotic-resistant *mycobacterium tuberculosis* strains are jeopardizing TB control efforts across the world. According to WHO, around 500,000 new cases of Rifampicin-Resistant Tuberculosis (RR-TB) were diagnosed globally in 2018, with the great majority having Multi-Drug Resistant Tuberculosis (MDR-TB), a type of tuberculosis that is resistant to the two most effective anti-TB medications. Only around one-third of the approximately 500,000 persons who got MDR/RR-TB in 2018 were identified and reported. MDR-TB necessitates longer, less effective and significantly more expensive treatment regimens than non-resistant TB. Less than 60% of those who are treated for MDR/RR-TB get cured. One of the most important concerns to malaria therapy is the evolution of drug-resistant parasites, which leads to increased morbidity and mortality. Most malaria-endemic nations treat *P. falciparum* malaria with Artemisinin-Based Combination Treatments (ACTs). ACTs are a combination of artemisinin plus another drug. In the WHO Western Pacific Region and the WHO South-East Asia Region, research done between 2001 and 2019 demonstrated partial resistance to artemisinin and resistance to a number of ACT partner medications in Cambodia, Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam. This complicates therapy selection and necessitates regular monitoring.

CONCLUSION

Because of continuous viral replication and extended drug exposure, which results in the selection of resistant strains, antiviral treatment resistance is becoming increasingly frequent in immunocompromised persons. Resistance has evolved to the majority of antivirals, including Antiretroviral (ARV) medicines.

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Because of the rise of drug-resistant HIV, all Antiretroviral (ARV) medications, even newer classes, are in danger of becoming partially or completely ineffective. Persons undergoing antiretroviral medication can develop HIVDR, and people can get infected with drug-resistant HIV. Because second and third-line treatments are far more expensive than first-line drugs, resistance has a considerable economic impact. The World Health Organization's HIV drug resistance program is tracking the spread and emergence of resistance to older and newer HIV medications throughout the world.