

Antimicrobial Resistance: A Major Issue in Global Public Health

Ram Hari Dahal*

Department of Microbiology, Tri-Chandra Multiple Campus, Tribhuvan University, Katmhandu, Nepal

***Corresponding Author:** Ram Hari Dahal, Department of Microbiology, Tri-Chandra Multiple Campus, Tribhuvan University, Katmhandu, Nepal.

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Introduction

Antibiotics are the drugs that either kill or inhibit the growth of microorganisms. In recent years, the continuous use of antibiotics is increasing due to which the antibiotics are losing its effectiveness and as a consequence antimicrobial resistance is increasing. Antimicrobial resistance (AMR) is not only a major life-threatening challenge to public health in the world but also aids financial burden to the public [1].

Almost all well-known antimicrobial agents lost their efficacy in previous form and become resistant to most common disease causing microbes which ultimately leads to multi-drug resistant (MDR). In recent days, most commonly used antibiotics like amoxicillin, cephalixin, erythromycin, ciprofloxacin, co-trimoxazole, tetracycline, and gentamicin have been continuously elevating their abilities to inhibit the pathogenic organisms.

Multi-drug resistant organism such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci, extended-spectrum β -lactamase (ESBL)-producing organisms, MDR *Pseudomonas aeruginosa*, MDR *Acinetobacter*, carbapenemase-producing *Enterobacteriaceae* (CPE) and multi-drug resistant forms of tuberculosis (MDR-TB) are principal issues and account for a major hospital-acquired infections [2–6]. Gram-positive bacteria, *Staphylococcus aureus* and *Enterococcus* spp. pose the greatest threat to public health [7].

Rise of antimicrobial resistance and its consequences

First antibiotic resistance was reported in 1940 with penicillin-resistant *Staphylococcus* [1]. The mechanism of antimicrobial resistance is a natural phenomena and develops when bacteria degrades antimicrobial drugs and alter bacterial proteins that are antimicrobial targets or changes in membrane permeability to antibiotics [8]. Basically improper treatment of antibiotics is a major cause for increment of resistant microbes.

In addition, various factors have contributed for the elevation of antimicrobial resistance which includes: over-the-counter access, misuse, pressure to prescribe antimicrobials unnecessarily, and failure to complete full course of treatment of antibiotics [1,9]. Use of antibiotics without doctor's prescription and medicating antibiotics for treatment of very simple illness such as common cold is a good example to contribute the rise in antimicrobial resistance.

Antimicrobial resistance is a global complication in public health. Centers for Disease Control and Prevention (CDC) estimates that antimicrobial resistance is responsible for more than two million infections and 23,000 deaths each year in the United States only [10]. Consumption of antimicrobial drug is increasing continuously and demands continue to rise. In 2000-2010, total global antibiotic consumption was raised by 30% [11].

The disease caused by antimicrobial-resistant microbes usually fails to standard drug therapy which leads to financial burden to patients due to longer periods of hospitalization. Increasing antimicrobial resistance prolongs the illness and results failure with first-line antimicrobial drug treatment which may urge to treat with second-line or third-line drugs [1].

Strategy for the reduction of antimicrobial resistance

Lack of appropriate policy of a country and poor awareness for use of antimicrobial agents has led to brutal scenario of antimicrobial resistance. This nightmare of antimicrobial resistance should be addressed in all countries. Discovery of novel antibiotics may be a choice to solve this problem but only a few antibiotics have been discovered in recent decades [12].

In the contrary, proper diagnosis and appropriate treatment of microbial diseases should be done to maintain the effectiveness of antibiotics. WHO (World Health Organization) issued a six-point policy package to counter the spread of antimicrobial resistance on World Health Day, 2011 [13]. In addition, control of spreading resistant bacteria may help to maintain the effectiveness of antibiotics.

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