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Indian Scenario of Antimicrobial Resistance In Livestock

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Abstract

The use of antimicrobials in livestock production exacerbates the threat that antimicrobial resistance poses to world health. Strong worldwide cooperation is needed to reduce the rising costs associated with the use of antibiotics in livestock production. To that goal, policymakers should use national and international food animal trade regulations, such as bans and user fees. The interactions between competing producers in the global meat market must be included in the evaluation of such policies, which is typically outside the purview of statistical models.

Keywords: Livestock, Antimicrobials, Resistance

Antimicrobial medications are used on both humans and animals and are crucial for maintaining public health all over the world. Antimicrobial resistance in bacteria that can infect humans can develop as a result of the use of antimicrobials in animals. The ability of microorganisms, such as bacteria, to withstand the effects of antimicrobials, the treatments used to kill the germs, is known as antimicrobial resistance (AMR). Antimicrobial medications are less effective at slowing or stopping the growth of bacteria as a result of the growing resistance of microbes to them. Infections in both humans and animals become more challenging to cure as a result. The rate of this resistance increases when antimicrobials are used extensively or incorrectly. Antimicrobial resistance can be brought on by a reduction in absorption, enzymatic inactivation or modification, or active drug efflux (Fig. 1.0).

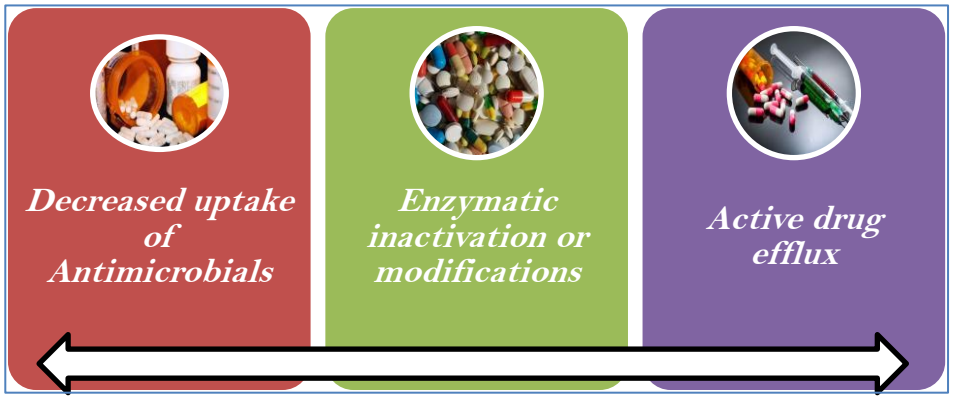

Fig 1.0: Mechanism of resistance (Illustrated by *Bhupamani Das*)

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How AMR spreads?

AMR develops throughout time, typically as a result of genetic alterations. People, animals, food, plants, and the environment (in water, soil, and air) all include antimicrobial resistant microbes. They can transmit from person to person, through humans and animals, or even via animal products in food. The misuse and overuse of antibiotics, a lack of access to clean water, sanitation, and hygiene (WASH) for humans and animals, inadequate infection and disease prevention and control in hospitals and farms, a lack of access to high-quality, reasonably priced medications, vaccines, and diagnostics, a lack of awareness and knowledge, and a lack of legal enforcement are the main causes of antimicrobial resistance. Some recent reports of antimicrobial resistance bacteria from India has been tabulated below (Table 1.0).

Table: Some recent reports of antimicrobial resistant bacteria from India

Report on antimicrobial resistance in animals	***Bacteria***	***Reference***
Isolation, Biochemical and Molecular Identification, and In-Vitro Antimicrobial Resistance Patterns of Bacteria Isolated from Bubaline Subclinical Mastitis in South India	*coagulase-negative staphylococci streptococci Escherichia coli and Staphylococcus aureus*	Preethirani *et al.*, 2015
First Report on Vancomycin-Resistant Staphylococcus aureus in Bovine and Caprine Milk	*Vancomycin resistant Staphylococcus aureus*	Bhattacharyya *et al.*, 2016
Detection of emerging antibiotic resistance in bacteria isolated from subclinical mastitis in cattle in West Bengal	*Escherichia coli, Proteus, Pseudomonas, Klebsiella, and Enterobacter*	Das *et al.*, 2017
Risk factor analysis, antimicrobial resistance and pathotyping of Escherichia coli associated with pre- and post-weaning piglet diarrhea in organized farms, India	*Escherichia coli*	Vinodkumar *et al.*, 2019
Prevalence, antimicrobial resistance and virulence genes of Salmonella serovars isolated from humans and animals	*Salmonella spp.*	Borah *et al.*, 2022

Challenges of AMR in India

The "AMR capital of the world" has been referred to as India (Chaudhary & Tomar, 2017). Newer multi-drug resistant (MDR) organisms provide newer diagnostic and therapeutic hurdles, but India is also working to fight off old foes like the viruses that cause cholera, malaria, and tuberculosis, all of which are evolving drug resistance. Malnutrition, overpopulation, poverty, and illiteracy are further contributing factors. They frequently choose not to seek medical assistance due to a lack of healthcare accessibility and a general lack of awareness about infectious diseases among the populace.

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Most frequently, this results in the self-prescription of antimicrobial drugs without any professional guidance on the dosage and length of therapy. Many people who seek medical guidance ultimately receive broad-spectrum medication. . Due to a lack of appropriate diagnostic tools for determining the pathogen and its drug susceptibility, many people who seek medical guidance wind up receiving broad-spectrum, expensive antibiotics. The spread of MDR organisms in hospital settings is aided by low doctor-to-patient and nurse-to-patient ratios as well as a lack of infection prevention and control (IPC) protocols. AMR is also exacerbated by the accessibility of over-the-counter (OTC) medications.

In conclusion, it can be stated that the inappropriate use of antibiotics has increased globally, including in India. To lower existing AMR rates and their effects on morbidity, death, and expenditures, this critical issue needs to be resolved. Key stakeholder groups, including governments, can implement a range of coordinated initiatives to enhance the use of antimicrobials in the future during pandemics and other situations, addressing concerns with the rising AMR rates. Usually, combining many tactics yields better results. Additionally, initiatives to lessen vaccine hesitancy in the public should be accelerated alongside successful campaigns to halt diseases that can be prevented by vaccination and the concomitant decline in the usage of antibiotics. These initiatives to reduce AMR can draw on already approved NAPs and other national initiatives.

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