



ANTIMICROBIAL RESISTANCE: A GLOBAL, NATIONAL, AND REGIONAL PERSPECTIVE WITH INSIGHTS FROM KASHMIR, INDIA

Medical Microbiology

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ABSTRACT

Antimicrobial resistance (AMR) poses a critical challenge to global health, with significant morbidity, mortality, and economic consequences. This short communication explores the international and Indian contexts of AMR, highlights its emerging burden in Kashmir, India, and proposes actionable strategies to combat this threat. Data from the World Health Organization, Indian Council of Medical Research, and Sher-i-Kashmir Institute of Medical Sciences underline the urgency for improved surveillance, public awareness, and stringent antimicrobial stewardship policies. Addressing AMR necessitates a concerted effort involving healthcare professionals, policymakers, and the public.

KEYWORDS

AMR, Kashmir, MRSA

INTRODUCTION

Globally, antimicrobial resistance (AMR) represents one of the most critical health challenges, with far-reaching implications for public health, food security, and economic development. A systematic analysis published in *The Lancet* (2022) identified AMR as a leading global health threat, responsible for an estimated 1.27 million deaths annually, exceeding the mortality rates of many infectious diseases.^[1] The World Health Organization (WHO), through its Global AMR and Use Surveillance System reports, has repeatedly underscored the growing prevalence of resistance to first line antimicrobials worldwide, particularly in low- and middle-income countries (LMICs).^[2,3] The economic impact of AMR is equally alarming, with the World Bank (2017) projecting potential global losses exceeding USD 100 trillion by 2050, driven by reduced productivity and increased healthcare costs.^[4] Globally, India recognized as one of the largest consumers of antibiotics faces a heightened burden of AMR due to the misuse of antibiotics in healthcare and agriculture.^[5,6] Surveillance data from the Indian Council of Medical Research (ICMR) and the National AMR Surveillance Network reveal rising resistance among key pathogens, underscoring the urgent need for coordinated interventions^[5,6]

In Kashmir, India, regional trends mirror the national crisis. The 2023 antibiogram from Sher-i-Kashmir Institute of Medical Sciences (SKIMS) documented significant resistance patterns among Gram-positive and Gram-negative bacteria, with notable resistance to commonly used antibiotics such as cephalosporins and carbapenems.^[7] These findings align with global concerns, as highlighted in the WHO Global Tuberculosis Report (2020), which stresses the increasing burden of multidrug-resistant tuberculosis (TB).^[8] Compounding this issue is the coronavirus disease 2019 (COVID 19) pandemic, which has inadvertently accelerated antibiotic misuse due to an uptick in empirical treatment and reduced access to diagnostic services. Further, as cited by Seethalakshmi et al., the AMR scenario in India might have worsened based on studies conducted on secondary infections in COVID-19 patients.^[9] This communication examines the AMR trends in Kashmir, with a focus on local surveillance data and its implications for public health policy and clinical practice.

Global Burden of AMR

In 2019, AMR accounted for approximately 1.2 million deaths directly and 4.95 million deaths indirectly.^[1] WHO estimates suggest that, by 2050, AMR could cause 10 million deaths annually, with a projected global economic impact of \$100 trillion^[4] LMICs, including India, bear the highest-burden due to weak healthcare systems and rampant misuse of antimicrobials^[2] The economic and social impact is staggering, with AMR potentially pushing 60 million people into extreme poverty by 2030.^[4]

Indian Context

Globally, India faces one of the highest rates of AMR with key pathogens including *Escherichia coli*, methicillin-resistant *Staphylococcus aureus* (MRSA), and multidrug resistant TB (MDR-

TB).^[6] High antibiotic consumption (14.5 DDD per 1000 population daily in 2020) exacerbates the problem.^[3] The ICMR's surveillance network reports increasing resistance trends: carbapenem-resistant *Pseudomonas aeruginosa* rose from 26% in 2017 to 30.5% in 2023, whereas ciprofloxacin resistance increased from 26% to 38.5%.^[5] MDR-TB remains a significant hurdle, with India contributing 30% of the global burden.^[8] The COVID-19 pandemic also saw the use of several "irrational" drugs such as Hydroxychloroquine (HCQ), and even extremely potent antibiotics such as carbapenems and colistin. This may present a concern to the resistance scenario – for instance, the development of HCQ-resistant *Plasmodium* sp.^[9]

AMR in Kashmir

Limited data highlights AMR as an emerging concern in Jammu and Kashmir. An analysis at SKIMS revealed that 62% of *S. aureus* isolates from inpatient departments and 100% from intensive care units were MRSA.^[7] Additionally, 40% of *Enterococci* isolates showed vancomycin resistance. While Gram-negative isolates retained susceptibility to last-resort antibiotics like colistin, the increasing prevalence of resistant pathogens signals an urgent need for action.

Recommendations

To address AMR, a multi-pronged approach is essential:

1. **Public Awareness:** Leverage media, schools, and public health campaigns to promote responsible antibiotic use.
2. **Regulation:** Enforce strict prescription laws and regulate antimicrobial use in agriculture.
3. **Infection Control:** Implement stringent hygiene protocols in healthcare settings.
4. **Surveillance:** Strengthen laboratory facilities for MDR detection and trend monitoring.
5. **Policy and Research:** Develop antibiotic stewardship policies and invest in AMR-focused research.
6. **Vaccination and Hygiene:** Promote water, sanitation, and hygiene initiatives to reduce infection rates.
7. **In Kashmir,** enhanced research and data collection are crucial for understanding and combating AMR.

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Conflicts of Interest

There are no conflicts of interest

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