

Rational Use of Antibiotics in Clinical Practice: Pharmacological Considerations

In the last 80 years, the human longevity has almost doubled. Several factors have contributed to it, advent and availability of antibiotics is one of them. The mortality and morbidity due to diseases such as cholera, plague, tuberculosis, syphilis, and others have drastically reduced, leading to replacing infectious diseases as killer number one, by lifestyle disorders even in developing country like India. But sadly, like in case of other categories of drugs, the antibiotics are also often overused and misused leading to new set of problems.

It is mandatory upon all doctors to use medicines rationally, particularly in respect of antibiotics. The “Rule of Right” – right medicine in the right manner (dose, route, frequency, and duration of administration) in the right patient at right cost – must be followed while using antibiotics. Unfortunately, irrational use of antibiotics is rampant and as common as the infectious diseases are. Irrational use of antimicrobials in clinical practice leads to several problems such as, failure of treatment, adverse drug reactions, superinfections, prolongation of therapy, development of antimicrobial resistance, and increase in cost of therapy. Causes of irrational use of antimicrobials include, inadequate medical training, nonavailability of diagnostic facilities, large-scale availability and use of irrational, fixed-dose drug combinations of antimicrobials, and ignoring the basic principles of selection and use of antimicrobials. All these can be easily avoided.

For rational use of antimicrobials, one does not need rocket technology! Recalling and implementing what was learned during undergraduate medical training may suffice. A strong foundation in microbiology, pharmacology, and clinical medicine will help in making a correct diagnosis and choosing the right antibiotics, to be given in right manner. While choosing the right antibiotic/s, one must consider relevant host factors, pathogen-related factors, and drug-related factors. Important host-related factors needing consideration include the age and immune status of patient, local factors like pH, presence of pus or blood, presence of foreign body or obstruction, genetic variations, history of allergies, pregnancy and lactation, presence of other diseases, and severity of infection under treatment. While considering organism-related factors, it should be decided whether the organism causing infection is community acquired or hospital acquired. Appropriate samples of the body fluids or pus must be obtained for culture and sensitivity testing before starting any antibiotic, where possible. “Best guess” method can be applied for empirical therapy. Results from analysis of antibiograms in local area may be of value. Drug-related factors include consideration where the drug being chosen is bacteriostatic or bactericidal, pharmacokinetic profile of drug,

its possible adverse effects, and not less importantly the cost of therapy. Risk and benefits of using FDCs or concurrent antibiotics must be weighed. In one of our studies,^[1] published in 2015, we had found that of all 16,599 drug formulations listed in Indian drug review (IDR), a whopping 37% were fixed dose combinations (FDCs). The Model List of Essential Medicines of the World Health Organization and National List of Essential Medicines, India, prevailing at that time had 6.7% and 4.6% FDCs only. It was noteworthy that nearly 30% formulations in the IDR were that of antimicrobials, indicating the extensive use of them. Of the antimicrobial formulations, 32% were FDCs. Nearly 70% of these antimicrobial FDCs were rated as irrational combinations!^[2] Considering the specificity in treatment of infectious diseases, using antibiotics, this certainly is pathetic scenario. One must remember that antibiotics are not nonspecific antipyretics or a new antibiotic is not always necessarily better! “higher antibiotic” is a myth. As much is the right choice of an antibiotic is important, equally, or more important is, how it is used. Prophylactic use of antibiotics, in general, and particularly in surgery, requires serious thinking.

Some solutions recommended for limiting the extent of irrational use of antibiotics, if not possible to totally avoid, include – adequate and appropriate training of a doctor during foundation stage, using only authentic sources of information, continuing medical education, practicing evidence-based medicine, conviction about the rational use of medicines, preparing and following “standard treatment guidelines” and “P-drug” lists, antibiotic use policy, putting in practice the “antimicrobial stewardship,” and “antibiotic prudence.” Antibiotic stewardship aims at combating the emergence of bacterial resistance, improving clinical outcomes and decreasing in health-care cost. This can be achieved by astutely following the principles laid above for rational use of antibiotics. However, other measures such as proper aseptic and antiseptic practice, frequent washing of hands, and deescalating antibiotic use are no less important measures. Rotational use of antibiotics at suitable intervals also provides an attractive practice. Above all, there should be a genuine concern for the suffering patient. The current issue of Journal of Integrated Health Science contains a paper entitled “Appropriate use of antimicrobial agents in urinary tract infections – Perception of Physicians and Resident Doctors” written by Lakhani *et al.* tries to highlight some issue concerning the appropriate use of antibiotics in urinary tract infections.

The bottom line is, rational use of antibiotics will not ensure good of the patient only, it will also ensure the same for us, the doctors.

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