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Antimicrobial resistance observed in the microbial ecosystem of a river during a mass gathering event.

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New Delhi, April 01: Antimicrobial resistance (AMR), i.e. the resistance of microorganisms to antibiotics, represents a major global threat to public health, causing ~0.7 million deaths annually. Antibiotic abuse including over the counter sale of antibiotics, higher dosage given to livestock, the introduction of effluents from the pharmaceutical industries, and untreated hospital and human waste into the water bodies, and cultural activities have been found to be main reasons for the spread of AMR.

Similarly, thousands of pilgrims bathing in the river during the Kumbh Mela, could result in large scale shedding of microorganisms associated with the human body into the river, and may therefore also play a role. This necessitates investigations into the influence that such mass gathering events can have on the microbial ecosystems of the river, and any consequences this might have on human health.

Dr. Yogesh Shouche and his group at the National Centre for Cell Science (NCCS) in Pune carried out a study to identify the microorganisms present in the Godavari river before and during the Kumbh mela. This study was led by Dr. Avinash Sharma, scientist on the NCCS project, National Centre for Microbial Resource.

The group obtained a total of sixty three bacterial and twenty one fungal isolates during this study. Bacteria belonging to the genera, *Kocuria* and *Staphylococcus*, and fungi belonging to the genera, *Meyerozyma* and *Candida* were found to predominate the microbial communities before and during the event.

The susceptibility to twenty two antibiotics of the different types of microorganisms that were obtained from this river was then tested. These antibiotics included different types that kill or inhibit bacteria by acting on various cellular processes that are necessary for the survival and growth of bacterial cells. A group of antibiotics that impede the cellular process of protein synthesis was found to be most effective against many ($\geq 67\%$) of the bacteria obtained through this study. However, it was found that 37-67% of the bacteria could escape the action of antibiotics that act on bacteria by inhibiting the process involved in building the cell wall, the structure surrounding the bacterial cell. Moreover, bacteria belonging to the genera, *Acinetobacter*, *Corynebacterium* and *Brevibacterium* were observed to have higher resistance towards the antibiotics used in the study. These investigations provide valuable insights that could help guide measures to mitigate waterborne infections during mass gathering events like the Kumbh Mela.

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Research article <https://www.ias.ac.in/article/fulltext/jbsc/044/05/0121>

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