

6<sup>th</sup> World Congress and Expo on **Applied Microbiology**  
&  
8<sup>th</sup> Edition of International Conference on **Antibiotics, Antimicrobials & Resistance**  
&  
12<sup>th</sup> International Conference on **Allergy & Immunology**  
October 21-22, 2019 Rome, Italy

## **Rise of multidrug-resistant bacteria in global water: Heterogeneous phyto-antibiotics, phage therapy and Ganga action plan may be the best hope for India tackling superbug spread**

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Life forms change with environment and microbes are now multidrug-resistant due to high doses of antibiotic use. Antibiotic dark age as was before 1928 seems to re-appear again in 2018. We have demonstrated to use heterogeneous phyto-antibiotics (MDR-Cure) to combat superbugs as used by ancient herbalers and structure-function of active principle is available today through the use of HPLC, NMR and FT-IR technologies. Kolkata Ganga River has polluted with MDR bacteria and *mdr* genes like beta-lactamases (*bla*CTX-M, *bla*OXA and *bla*NDM-1), acetyl-, phospho- and adenyl- transferases (*aac*C1/A2, *aph*A4, *aad*A2) as well as *mcr*, *tet*, *acr* and *mex* types drug efflux genes including *vanA* gene cluster, *penA*, *sul*1/2/3, *pncA*, *dhfr* and *mcr*-1 genes. About 40% bacteria are ampicillin resistant including 0.02% resistant to advanced drug derivatives like imipenem, colistin, amikacin, linezolid, vancomycin, ceftriaxone and lomefloxacin. Ganga Action Plan has initiated by Indian Government with estimated >40000 crores when all industrial and domestic effluents will be treated before reaching the river. However, no action plan on MDR bacteria contamination and many Indians still drink raw Ganga River water in religious occasions and bath in Allahabad Sangam. MDR bacteria are created and transmitted to save 2x10<sup>12</sup> diverse species of gut microbiota that synthesize 20 vitamins and bio-molecules absolutely needed for human metabolosome. It has been suggested that LPS, vitamins and butyrate from intestinal bacteria activate luminal cells to secrete interleukins and cytokines that might orchestrated to synthesis diversified *mdr* genes in conjugative plasmids. Indian medicinal plants like *Suregada multiflora* and *Cassia fistula* will give a new dimension to combat MDR pathogenesis due to advancement in agriculture and tissue culture. Phage therapy is in advanced mode for FDA approval and we have detected less lytic phages in Ganga River water. WHO has issued Action Plan and G-20 Leaders and Scientists are together for superbug control.