Editorial

iMedPub Journals
http://www.imedpub.com/

British Biomedical Bulletin
ISSN 2347-5447

2017
Vol.5 No.2:304

DOI: 10.21767/2471-9897.1000304

Reverse Antibiotic Resistance: Horizon of New Hope

Guru Prasad Manderwad*

Department of Microbiology, Kamineni Academy of Medical Sciences and Research Centre, Hyderabad, Telangana, India

***Corresponding author:** Guru Prasad Manderwad, Assistant Professor, Department of Microbiology, Kamineni Academy of Medical Sciences and Research Centre, L.B. Nagar, Hyderabad-500068, Telangana, India, Tel: +914065508800; E-mail: gurukmc@gmail.com

Received date: June 15, 2017; **Accepted date:** June 20, 2017; **Published date:** June 30, 2017

Citation: Manderwad GP (2017) Reverse Antibiotic Resistance: Horizon of New Hope. Br Biomed Bull 5: 304.

Editorial

Multidrug resistant (MDR) bacteria are posing great threat and challenge to the mankind worldwide and also added new dimensions in the treatment and management of the patients. Antibiotic resistance has been noticed in both gram positive and gram negative bacteria. The methicillin resistant *Staphylococcus aureus* (MRSA) are resistant to methicillin and several other antibiotics and has been associated with the nosocomial infections. The presence of pan resistant gram negative bacteria including *Pseudomonas aureginosa*, *Acientobacter Sp.* and *Klebsiella Sp.* have challenged the treatment leading to the increase in the morbidity and mortality of the patients [1]. The pathogenic organisms have developed several mechanisms to inactivate the action of the antibiotics including mutational alteration of the target protein, inhibition of the drug access, presence of drug specific efflux pumps, alteration in the drug binding sites due to the methylation at the ribosomal regions [1].

Several strategies have been developed to avoid the development of the multidrug resistance in bacteria, which includes prescribing appropriate antibiotics, conducting antimicrobial stewardship programs to optimize the antimicrobial therapy leading to the reduction in treatment related cost and improving the treatment outcome [2]. The application of the hygienic techniques, appropriate use of disinfectants and treatment with the novel antibiotics also play a key role in regulating the development of the MDR bacteria [2]. Recent studies have focused on reversing or sensitizing or modulating the multidrug resistance in bacteria. The molecules which have an ability to reverse or sensitize or modulate the multidrug resistance in bacteria are derived from various sources including plants, synthetic origin and antibiotics. The application of phages also shown to reverse the antibiotic resistance.

The plant extracts and its ability to modulate the bacterial drug resistance has been extensively studied. A study conducted by Aime and coworkers studied the plant extracts including *Allanblackia gabonensis, Combretum molle* and *Gladiolus quartinianus*, found their ability to sensitize the MDR gram negative bacteria [3]. Several other studies also demonstrated the applicability and usefulness of the plant extracts to reverse the MDR in bacteria [4-6]. Along with the application of plant extracts several other sources are known to modulate the bacterial drug resistance. Synthetic compounds including promethazine [7] shown synergetic effect with the gentamicin, the thioridazine [8] has an ability to eliminate the intracellular tuberculosis and is known to be an efflux pump inhibitor. Studies have been carried out and underway to evaluate the application of several other synthetic drugs including arylpiperazines [9] which enhances the susceptibility of MDR *E. coli* to florquinolones. Along with the synthetic drugs several peptides have shown their ability in modulating the multidrug resistance in bacteria [10-12].

The Hiramatsu and coworkers rediscovered the nybomycin action against the quniolone resistant *Staphylococcus aureus* strain with mutated gyrA genes and termed nybomycin as the first member of novel class of antibiotics termed as “reverse antibiotics” [13]. The phage mediated delivery of dominant sensitive genes allowed the MDR organisms becoming susceptible to antibiotics [14]. The usage and the switching off and on certain combinations of the antibiotics aided in the suppression of the development of multidrug resistance in the pathogenic bacteria [15].

To conclude the presence of MDR organisms poses a great threat to the outcome of the treatment as well as raises the economic burden. Several above mentioned strategies have been evolved and further advance research is happening to reverse antibiotic resistance and helping us to see a new horizon of hope in the treatment and management of the patients.

References

1. Nikaido H (2009) Multidrug resistance in bacteria. Annu Rev Biochem 78: 119-146.
2. Lee CR, Cho IH, Jeong BC, Lee SH (2013) Strategies to minimize antibiotic resistance. Int J Environ Res Public Health 10: 4274-4305.
3. Fankam AG, Kuiate JR, Kuete V (2015) Antibacterial and antibiotic resistance modifying activity of the extracts from Allanblackia gabonensis, Combretum molle and Gladiolus quartinianus against Gram-negative bacteria including multi-drug resistant phenotypes. BMC Complement Altern Med 15: 206.
4. Seukep JA, Sandjo LP, Ngadjui BT, Kuete V (2016) Antibacterial and antibiotic-resistance modifying activity of the extracts and

compounds from Nauclea pobeguinii against Gram-negative multi-drug resistant phenotypes. BMC Complement Altern Med 16: 193.

5. Chovanova R, Mikulasova M, Vaverkova S (2013) In vitro antibacterial and antibiotic resistance modifying effect of bioactive plant extracts on methicillin-resistant Staphylococcus epidermidis. Int J Microbio 7: 760969.
6. Chovanova R, Mezovska J, Vaverkova S, Mikulasova M (2015) The inhibition the Tet(K) efflux pump of tetracycline resistant Staphylococcus epidermidis by essential oils from three Salvia species. Lett Appl Microbiol 61: 58-62.
7. Molnar J, Haszon I, Bodrogi T, Martonyi E, Turi S (1990) Synergistic effect ofpromethazine with gentamycin in frequently recurring pyelo nephritis. Int Urol Nephrol 22: 405-411.
8. Ordway D, Viveiros M, Leandro C, Bettencourt R, Almeida J, et al. (2003) Clinical concentrations of thioridazine kill intracellular multidrug-resistant Mycobacterium tuberculosis. Antimicrob Agents Chemother 47: 917-922.
9. Bohnert JA, Kern WV (2005) Selected arylpiperazines are capable of reversing multidrug resistance in Escherichia coli over expressing RND efflux pumps. Antimicrob Agents Chemother. 49: 849-852.
10. Mohamed MF, Abdelkhalek A, Seleem MN (2016) Evaluation of short synthetic antimicrobial peptides for treatment of drug-resistant and intracellular Staphylococcus aureus. Sci Rep 6: 29707.
11. Abushahba MF, Mohammad H, Seleem MN (2016) Targeting Multidrug-resistant Staphylococci with an anti-rpoA peptide nucleic acid conjugated to the HIV-1 TAT cell penetrating peptide. Mol Ther Nucleic Acids 5: e339.
12. Haisma EM, De Breij A, Chan H, Van Dissel JT, Drijfhout JW, et al. (2014) LL-37-derived peptides eradicate multidrug-resistant Staphylococcus aureus from thermally wounded human skin equivalents. Antimicrob Agents Chemother 58: 4411-4419.
13. Hiramatsu K, Igarashi M, Morimoto Y, Baba T, Umekita M, et al. (2012) Curing bacteria of antibiotic resistance: Reverse antibiotics, a novel class of antibiotics in nature. Int J Antimicrob Agents 39: 478-485.
14. Edgar R, Friedman N, Mor S, Qimron U (2012) Reversing bacterial resistance to antibiotics by phage-mediated delivery of dominant sensitive genes. Appl Environ Microbiol 78: 744-751.
15. Yoshida M, Reyes SG, Tsuda S, Horinouchi T, Furusawa C, et al. (2017) Time-programmable drug dosing allows the manipulation, suppression and reversal of antibiotic drug resistance in vitro. Nat Commun 8: 15589.