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Der Pharmacia Lettre, 2022, 14(7): 05-07
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ESKAPE Pathogens: Current Status and Emerging Challenges

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Received: 10-Jun-2022, Manuscript No. DPL-22-70496; Editor assigned: 13-Jun-2022, Pre QC No. DPL-22-70496 (PQ); Reviewed: 27-Jun-2022, QCNo. DPL-22-70496; Revised: 04-Jul-2022, Manuscript No. DPL-22-70496(R); Published: 11-Jul-2022, DOI: 10.37532/dpl.2022.14.05.

DESCRIPTION

Needless to say, Anti-Microbial Resistance (AMR) is a global health concern in the present scenario threatening global progress in various aspects which strikes hardest on the poor, cause untreatable infections even in the animals thereby affecting sustainable food production, and healthcare systems and being an integral part of the environment, contaminating water and land with residues and many more. The causative microbes of this emerging resistance which has moved to the top 10 threats to public health as per WHO, include bacteria, fungi, viruses and parasites, of which bacteria have been observed to play a key role (WHO). The spread of this antimicrobial resistance can be attributed to a variety of factors including misuse and/or overuse of drugs leading to the spread *via* human contact, animal contact including food or *via* environmental sources, lack of access to clean Water, Sanitation or Hygiene (WASH) for humans and animals, poor infection control in health care facilities, lack of awareness and knowledge and many more Further investigations in this direction have led to identification of top priority pathogens list of WHO were in ESKAPE (virulent and antibiotic resistant bacterial pathogens) holds critical importance.

These pathogens include *Enterococcus faecium* and *faecalis*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter* spp. Multiple initiatives have been undertaken by various groups across the world in order to keep a check on this emerging resistance such as GLASS program (Global Antimicrobial Resistance and Use Surveillance System), Antimicrobial Resistance Multi Partner Trust Fund (AMR MPTF), the Global Antibiotic Research and Development Partnership (GARDP), Global Action Plan on Antimicrobial Resistance (GAP), etc. to combat the same leading to the development of "One Health Approach".

Although with the rise in these infections worldwide, both the categories CAI and HAI are known to contribute to the same, there have been discrepancies in the spread rate of these infections. Studies by David M. P. De Oliveira et al. suggest a rise in the CAI with a decline in HAI in developed countries like the US which can be attributed to the well-developed medical facilities and their access to the common

population [1]. However in light of the same, it is quite surprising to observe the rise in the spread of CAI considering the well-developed medical facilities, literacy rate and awareness of the general public [2,3].

It has been almost a century since the first antibiotic penicillin was discovered in 1928 by Alexander Fleming. We have come a long way since then in terms of discovery and use of antibiotics for the treatment of bacterial infections. To combat the same, researches have been carried out to focus on the alternative strategies such as photodynamic light therapy, bacteriophage therapy, antimicrobial peptides, antibacterial antibodies, phytochemicals, nanoparticle based drug delivery, etc. [4]. Besides these, use of antibiotics in combination targeting multiple pathways at the same time may prove to be another effective strategy towards AMR [5]. As described above, ESKAPE pathogens (virulent and antibiotic resistant bacterial pathogens) are considered to be the global priority pathogens (WHO reports 2017) owing to their emerging resistance towards available antibiotics. Thus, many of these strategies are being tried towards these resistant isolates.

On a similar note, the analysis of spread of pathogens in the current scenario has led to the identification of certain pathogens rising amongst the other ESKAPE pathogens (virulent and antibiotic resistant bacterial pathogens). The analysis of antimicrobial resistance index for each of the ESKAPE pathogens (virulent and antibiotic resistant bacterial pathogens) has suggested that the most serious challenges at present are *A. baumannii*, *P. aeruginosa*, and *E. faecium* and their multi-resistant form which are expected to be the most challenging ones for us to manage by 2030 [6]. Such analysis of all the resistant pathogens and preparation of the index would be a valuable asset in determining the actual gravity of the situation which in turn would be crucial for the prevention and control strategies of the same.

On the other hand, resistance is being observed in the isolates towards the third and fourth generation antibiotics. Results from our preliminary experiments with the ESKAPE (virulent and antibiotic resistant bacterial pathogens) isolates obtained from Jaipur, Rajasthan have shown the isolates to be sensitive towards Colistin and Gentamicin, the first generation drugs while resistance towards Ciprofloxacin, Ceftazidime etc., the second and third generation drugs. Similar patterns have been observed with studies elsewhere suggesting the reuse of first generation drugs such as colistin in the recent past [7,8]. Multiple reasons could be attributed to the same.

This could further be enhanced by the fact that continuous usage of one category of drugs, third generation in this scenario, could contribute to the resistance being observed [9]. The association between hospital acquired infections and resistant bacteria is placing an additional burden on healthcare systems and driving up expenses globally. In line with the same, "ESKAPE pathogens," (virulent and antibiotic resistant bacterial pathogens) a diverse group of gram positive and negative bacteria that are Multi Drug Resistant (MDR) and extensively drug resistant XDR and account for 15.5 percent of all hospital acquired infections have evolved as a result of increased antibiotic use, self-medication, and infection exposure in hospitals (HAIs).

Additionally, the current trends of resistance offered by these isolates towards different generations of antibiotics and their possible reasons are discussed. However, all these speculations need to be validated before one gets to a conclusion and this we believe is another crucial point to be kept in mind while identifying novel molecules so as to prevent the similar fate of the upcoming antibiotics.

REFERENCES

- [1] Guarascio A J., Brickett L M., Porter T J., et al., *J Pharm Pract*, **2019**, 32(1):19-27.
- [2] Maki G., Zervos M. *Infect Dis Clin*, **2021**, 35(3):827-839.
- [3] Deen J., Von Seidlein L., Andersen F., et al., *Lancet Infect Dis*, **2012**,12(6):480-780.
- [4] Mulani M S., Kamble E E., Kumkar S N., et al., *Front Microbiol*, **2019**, 10:539.
- [5] Annunziato G. *Int J Mol Sci*, **2019**, 20(23):5844.
- [6] Orosz L., Lengyel G., Ánosi N., et al., *Acta Microbiol Immunol Hung*, **2022**,69(1):27-34.

[7] Dhariwal A K., Tullu M S. *J Postgrad Med*, **2013**, 59(3): 68-208.

[8] Bergen P J., Li J., Nation R L. *Curr Opin Pharmacol*, **2011**,11(5):464-469.

[9] Shortridge D., Carvalhaes C G., Duncan L R., et al., *J Antimicrob Chemother*, **2020**,75(10):115-302 .