Special article on Penicillin sensitive organisms

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Antibiotics have been critical in the fight against infectious disease caused by bacteria and other microbes in the past few decades. This has resulted in the dramatic rise in life expectancy in this century. However, the emergence of antimicrobial resistance is an important problem faced by clinicians in recent times. Wound infections, gonorrhoea, tuberculosis, pneumonia, septicaemia, urinary tract infections etc., are just a few of the diseases that have become hard to treat with antibiotics. Bacteria have developed numerous ways to fight with and win over antibiotics. With the increasing use and misuse of antibiotics not only in medicine, but also in other fields like veterinary medicine and agriculture, we also help in the emergence of drug resistance.

Ever since the discovery of penicillin in 1929 and its availability for treatment in 1946, it was the mainstay of treatment in many diseases including syphilis and many other infections caused by Gram-positive bacteria. In the 1940s itself, penicillin resistant staphylococci started emerging, followed by resistant strains of other organisms also for which penicillin was lifesaving once. In this era, with a wide range of multi drug resistant organisms and a wider range of resistance mechanisms, we thought of analysing the isolates which are susceptible to the once upon a time wonder drug, penicillin.

We sent the questionnaire to many centres, but only six centres, five from Kerala and one from Karnataka responded. We have analysed the data and tabulated the results.

Table 1 shows the total number of bacterial isolates from specimens other than urine and faeces and the number and percentage of penicillin sensitive organisms. The centres showed a sensitivity of 12.5% on an average, the highest being 39%, and lowest being 8.48%.

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Analysis of the predominant isolates from different centres Table 2 shows that streptococci predominate the list followed by *Staphylococcus aureus*, *Enterococcus* and coagulase negative staphylococci. It is a wonder that *Salmonella* managed to come into the first four sensitive strains. The centre reported that the ampicillin sensitive isolates of *Salmonella* included *Salmonella typhi* and also other species. Gram-negative bacilli like *Proteus* spp. and *Citrobacter* spp. have found a place in the list in one centre. As mentioned in the editorial, it is important to do minimum inhibitory concentrations (MIC) of penicillin to determine its susceptibility and its effective use in treatment. The method of sensitivity testing and MIC was not asked and none of the centres have mentioned about it. *Streptococcus pneumoniae* and *Streptococcus pyogenes* have showed 100% sensitivity to penicillin whereas sensitivity of *S. aureus* ranges from 6% to 14.5% in various centres. The data shows that the judicious use of penicillin can still save the lives of many patients infected with life-threatening conditions like pneumococcal meningitis.

World Health Organisation in a recent report has commented on antibiotic resistance as a global threat comparable to global warming. They describe a 'post-antibiotic era', where people die from simple infections that have been treatable for decades. They state this problem will have devastating implications until significant actions are taken.

'It has been demonstrated that a species of *Penicillium* produces in culture a very powerful antibacterial substance, which affects different bacteria in different degrees. Generally speaking, it may be said that the least

Table 1: Total number of penicillin sensitive organisms

Centre	Total number of bacterial isolates from all specimens other than faeces and urine	Total number of penicillin sensitive organisms (%)
1	3226	369 (11.4)
2	2428	363 (14.9)
3	2400	275 (11.45)
4	578	49 (8.48)
5	7666	1249 (16.29)
6	478	185 (39)

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Table 2: Analysis of four predominant isolates and their % sensitivity

Centre	Predominant isolates (% sensitivity to penicillin/ampicillin)			
	1	2	3	4
1	*S. pneumonia* (100)	Other streptococci (93.8)	*Enterococcus* spp. (86.84)	*S. aureus* (13.83)
2	*S. pyogenes* (100)	*S. pneumonia* (100)	*S. aureus* (9.7)	Coagulase negative staphylococci (24.4)
3	*Enterococcus* spp. (79.05)	Coagulase negative staphylococci (17.92)	β haemolytic streptococci (100)	*Salmonella* spp. (100)
4	*S. aureus* (12.64)	*Citrobacter* spp. (12.5)	*Enterococcus* spp. (8.88)	*Proteus* species (5.2)
5	*S. aureus* (6)	Coagulase negative staphylococci (10)	*E. faecalis* (25)	*E. faecium* (0)
6	*S. pneumonia* (100)	*Enterococcus* spp. (77)	Coagulase negative staphylococci (35)	*S. aureus* (32)

S. pneumonia: *Streptococcus pneumonia*, *S. aureus*: *Staphylococcus aureus*, *S. pyogenes*: *Streptococcus pyogenes*, *E. faecalis: Enterococcus faecalis*, *E. faecium*: *Enterocccus faecium*

sensitive bacteria are the Gram-negative bacilli, and the most susceptible are the pyogenic cocci… In addition to its possible use in the treatment of bacterial infections penicillin is certainly useful… for its power of inhibiting unwanted microbes in bacterial cultures so that penicillin insensitive bacteria can readily be isolated'.

–Alexander Fleming

This was Fleming's initial comments about his fruitful discovery. We know that the world (of humans as well as microbes) has travelled far from this and now reached a stage where superbugs have started dominating. Still we have some time left to change the scenario by the judicious use of antibiotics.

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Centres which participated:

1. Adichunchanagiri Institute of Medical Sciences, BG Nagara, Bellur, Karnataka, India
2. Amala Institute of Medical sciences, Thrissur, India
3. MES Medical College, Perinthalmanna, Malappuram, India
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