

## RESISTANCE TO ANTIBACTERIAL DRUGS IN COMMENSAL BACTERIAL FLORA IN SOUTH INDIA

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In 1984 a study was carried out at the Christian Medical College Hospital (CMCH) in Vellore, Tamil Nadu, South India to investigate resistance to antibiotics in pathogens causing urinary tract infections. This investigation reported high levels of resistance to ampicillin and trimethoprim. Resistance to ampicillin (Minimum Inhibitory Concentration (MIC) >10mg/L) was found in 77% of Escherichia coli isolated (Nandivada & Amyes 1987) and 64% were resistant to trimethoprim (MIC > 10mg/L)(Young et al 1986).

In 1989, we returned to CMCH to establish if the reservoirs of the antibiotic resistance genes were actually located in the commensal faecal flora of the healthy population. Two cohorts of volunteers were recruited: an urban group (U) from the people of the town of Vellore (pop. 150,000) and a rural group (R) from villages situated about 40km from the town. Three villages were used; Kilvayattarakuppam - a roadside village with good access to the town, Kavanur - a riverside village with moderate access and Melmoil - a village in the foothills with poor communications. In both study groups faecal specimens were taken from volunteers who were at least five years old, apparently healthy and had received no antibacterial chemotherapy in the previous week. Each specimen (92 from the urban study and 122 from the rural group) was initially examined for the presence of large Gram-negative rods (not Pseudomonas) which were resistant to trimethoprim, ampicillin, chloramphenicol or nalidixic acid. The faecal specimens were plated out onto a Macconkey-like agar containing each of these drugs (at 10mg/L). There was almost universal carriage of enterobacteria resistant to trimethoprim (U=98.3%, R=100%), ampicillin (U=98.9%; R=97.5%) and chloramphenicol (U=96.8%; R=97.5%). There was neither any significant difference between the proportions in the urban and rural study areas nor between proportions from the individual villages, despite the varying degree of remoteness. On the other hand, the carriage of nalidixic acid resistance was considerably lower. However, it was significantly more common in the urban population (29.7%) than in the rural (11.2%) ( $\chi^2 = 7.84$ ;  $0.01 > p > 0.001$ ).

Further study on the trimethoprim resistant strains has revealed that 86% of them were highly resistant (MIC >1000mg/L), which is indicative of a plasmid origin of the gene. However, only a minority of these highly resistant strains were capable of transferring trimethoprim resistance. None of the nalidixic acid resistant strains tested were resistant to ciprofloxacin (1mg/L) despite the free availability of this drug in India.

These results provide evidence that the commensal gut flora of the human population, in this part of India, acts as a reservoir for antibiotic resistance genes which may then be acquired by pathogens. Such high carriage rates of resistant commensals may be stimulated by the free availability of antibiotics "over the counter" without prescription. Antibacterial drugs, bought in Vellore, were examined by bio-assay and absorbance spectrum analysis and found to be virtually identical to equivalent drugs obtainable in the UK and USA.

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Nandivada, L.S. & Amyes, S.G.B. (1987) *J.Pharm.Pharmacol.* 39:18P.  
Young, H-K. et al (1986). *J.Antimicrob.Chemother.* 17:615-621.