Comparative in-vitro activities of trimethoprim-sulfamethoxazole and the new fluoroquinolones against confirmed extended spectrum β-lactamase producing Stenotrophomonas maltophilia recovered from the Eastern Cape Province, South Africa

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Stenotrophomonas maltophilia is increasingly emerging as an opportunistic pathogen of global concern. Due to its inherent resistance to several classes of antibiotics including carbapenems and its ability to acquire mobile resistance elements, treatment of infections caused by S. maltophilia is a constant challenge for clinicians. Trimethoprim-sulphamethoxazole (TMP-SMX) is the generally accepted antibiotic of choice for the treatment of infections caused by this organism, but resistance to the drug is increasingly being reported; hence, the need for alternative therapeutic options. In this study, the antimicrobial susceptibility profile of one hundred and ten (110) commensal Stenotrophomonas maltophilia isolates obtained from Nkonkobe municipality, Eastern Cape Province was investigated. Twenty one antibiotics including trimethoprim-sulphamethoxazole and the newer fluoroquinolones; levofloxacin, gatifloxacin and moxifloxacin were included in the antibiotic panel. About 63.4% of the isolates were susceptible to trimethoprim-sulfamethoxazole with a resistance rate of 28.2%. The fluoroquinolones were more effective with susceptibilities ranging from 76% to 94.7%. Resistance to the fluoroquinolones ranged from 1.3% to 2.7%. Levofloxacin was the most effective fluoroquinolone tested. Phenotypic detection of ESBLs showed double disc synergy test (DDST) positivity in 59.5% of the isolates. Cefepime was the most sensitive indicator cephalosporin in the DDST with 77.3% of suspected ESBL-producing isolates showing cefepime-clavulanic acid synergesty. The isolates exhibited nine different ESBL phenotypes, however, PCR amplification of the bla genes revealed four isolates that possessed genes belonging to the CTX-M group (CTX-M-1 and CTX-M-8 groups). ESBL genes are usually carried on mobile elements such as plasmids and transposons which may also bear genes that mediate resistance to aminoglycosides, tetracyclines, trimethoprim-sulphamethoxazole and fluoroquinolones. ESBL positive isolates appeared more susceptible to the fluoroquinolones compared to TMP-SMX but there was no significant relationship between ESBL production and susceptibility to these drugs (p>0.05). The newer fluoroquinolones are a possible alternative treatment option for S. maltophilia infections in this environment but further studies and clinical investigations are needed to determine the in vivo efficacy of these drugs.

Biography

Adeyemi O O holds BSc (Hons), MSc and PhD degrees in Microbiology. He has been a recipient of awards, such as Postgraduate Fellowship Award, Obafemi Awolowo University, Ile-Ife, Nigeria, 1990-1992; United Nations University Fellowship (1998); UNESCO Biotechnology Action Council Fellowship (2000), as well as several grants from the NRF, MRC, WRC, ESKOM, RSD/FID and ISRAR/APUA. He has 300 publications made of over 195 journal articles; several conference presentations and nucleotide sequences deposited in GenBank in his academic career of over two decades. In 2007, he established his research group called Applied and Environmental Microbiology Research Group (AEMREG) in the Department of Biochemistry and Microbiology of the University of Fort Hare, and the group is currently made up of about 30 research students at the Honours, Master’s and Doctoral levels. He is President of the South Africa Society for Microbiology (2011-2013), and in November 2013 he was appointed Leader of the Water Resources for Sustainable Development Niche Area at the University of Fort Hare for the next five years. He is also a member of the South Africa National Committee on IUMS, and also a C2 (Established Researcher) rated researcher.