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Pattern of antimicrobial resistance in a spectrum of aerobic bacteria isolated from various infectious conditions affecting patients in Sudan

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Background: Antimicrobial resistance is an emerging global public health problem. Countries of the developing world are mostly affected and Sudan is included. The most serious concern is that some bacteria acquire resistance to almost all routinely used antibiotics. Such bacteria are capable of causing serious infections that are very difficult to treat. We therefore, were interested in studying the existence and extent of antimicrobial resistance in clinically isolated bacteria.

Objectives: We aim at studying the antimicrobial susceptibility pattern of a group of pathogenic aerobic bacteria that are isolated from patients suffering from infectious conditions and attending different hospitals in Khartoum city.

Methodology: This is a laboratory-based descriptive study. Clinical isolates were collected from patients attending Soba, Khartoum, Omdurman Pediatric, Omdurman Emergency and Al-Zaytona hospitals in addition to the Jordanian Medical Centre. Standard bacteriological protocols and the modified Kirby-Bauer disc diffusion assays were applied. The ethical clearance for conducting this study was obtained from the Ethical Committee Board of UMST and hospitals authorities.

Results: Out of 150 isolates; 130 [87%] were Gram negative, these included; *Escherichia coli* [55, 36%], *Klebsiella pneumonia* [36, 24%], *Proteus* spp. {[24, 16%]: *Proteus mirabilis* [13, 54%] and *Proteus vulgaris* [11, 46%]}, *Enterobacter* spp. [6, 4%] and *Pseudomonas aeruginosa* [9, 6%]. Gram positive bacteria were 20 [13%], these included; 10 [7%] of each of *Staphylococcus aureus* and *Enterococcus faecalis*. Amongst strains of enterobacteria, high resistance was seen with Ampicillin [113, 93%], Amoxicillin [120, 99%], Trimethoprim [110, 91%] and Nalidixic Acid [71, 59%]. Among *Pseudomonas aeruginosa* strains, high resistance was seen with Ampicillin [9, 100%], Amoxicillin [9, 100%], Nalidixic Acid [7, 80%] and Nitrofurantoin [5, 60%]. Amongst strains of enterobacteria, high sensitivity was detected with Amikacin [116, 96%], Tetracyclin [67, 55%], Ciprofloxacin [81, 67%], Gentamycin [97, 100%] and Norfloxacin [108, 94%]. Among *Pseudomonas aeruginosa* strains, high sensitivity was seen with Amikacin [9, 100%], Ciprofloxacin [9, 100%] and Gentamycin [7, 75%]. All [10, 100%] *S. aureus* strains were resistant to Fusidic acid. Among *Enterococcus faecalis* isolates, high resistance was seen with Ampicillin [10, 100%], Vancomycin [8, 80%] and Cefotaxime [7, 70%]. Among *S. aureus* strains, high sensitivity was seen with Tetracyclin [10, 100%], Gentamycin [8, 80%], Amikacin and Clindamycin [7, 70%], and Methicillin [6, 60%]. Among *Enterococcus faecalis* strains, high sensitivity was seen with Nitrofurantoin [10, 100%] and Amikacin [7, 70%].

Conclusion: According to our findings, we conclude that antimicrobial resistance has emerged and strongly exists in Khartoum, Sudan. Resistance rate is high in aerobic Gram negative bacilli relative to Gram positive cocci. Multi-drug resistance to the easily available and locally used antibiotics is common. We, therefore, encourage clinicians to prescribe suitable alternatives. We, also encourage the health care authority to apply measures to control this problem in Sudan.

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