Aspirin versus cyclooxygenase-2 inhibitors as quorum sensing inhibitors of Pseudomonas aeruginosa

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Background: Quorum sensing (QS) systems, which are intra and inter species, signaling systems regulate expression of several genes, many of these coding for virulence factors. Quorum sensing inhibitors (QSIs) are chemicals that interfere with QS-controlled gene regulation. Pseudomonas aeruginosa has the most accurately studied bacterial QS behavior.

Objectives: Our work aimed to compare in vitro effects of Aspirin versus Cyclooxygenase-2 (COX-2) inhibitor (Etodolac) on QS-controlled virulence factors of Pseudomonas aeruginosa.

Methodology: Our study was conducted on thirty Pseudomonas aeruginosa isolates which were identified by standard bacteriological techniques. We tested the effects of Aspirin versus Etodolac on the production of QS-controlled virulence factors: biofilm formation: using microtiter plate crystal violet assay, Pyocyanin production by chloroform extraction and elastase production by Elastin Congo Red assay.

Results: Twenty percent of the isolates had inhibited biofilm formation ability and elastase enzyme activity with each of the two drugs. Pyocyanin production was more sensitive to the QSIs, with as much as 73.3% of isolates being inhibited by Aspirin and 40% of them were inhibited with Etodolac. Etodolac showed stronger inhibition activity of 49.8% for pyocyanin pigment production versus Aspirin which had only 28.1%. Aspirin more strongly inhibited biofilm formation by 32.6% in contrast to 20.4% by Etodolac. Both Aspirin and Etodolac exhibited comparable inhibition of 51.6% and 56% for elastase enzyme production respectively.

Conclusions: COX-2 inhibitors were shown to have effective QSI effects. Both Aspirin and Etodolac had comparable inhibitory strengths.

Bacterial etiology of ventilator associated pneumonia and its antimicrobial susceptibility profile in Suez Canal University Hospital intensive care units

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Background: Ventilator-associated pneumonia (VAP) is an important form of health care associated pneumonia and is associated with increased morbidity and mortality.

Aim: The present study was undertaken to estimate the rate of VAP and to determine the bacterial pattern and the antibiotic susceptibility profile of the isolated agents from the endotracheal aspirates of the clinically suspected VAP patients.

Methods: A cross-sectional, descriptive study was performed over a period of six months in a tertiary care hospital, enrolling patients on mechanical ventilation (MV) for >2 calendar days. Endotracheal aspirates (ETA) were collected from patients with suspected VAP, and direct Gram stain was used to evaluate the quality of samples and for screening. Quantitative cultures of ETA were performed with the threshold for microbiological diagnosis was taken as ≥ 10^5 colony forming units (CFU)/ml.

Results: Of 220 mechanically ventilated patients in Suez Canal University ICUs, 64 patients developed VAP over a period of six months. VAP rate was 26 cases/1000 ventilator days. Out of 64 cases, 80% were late onset; 60 (94%) were monomicrobial infection, while 4 (6%) were polymicrobial. Acinetobacter baumannii (30.9%); Klebsiella pneumoniae (29.4%); Pseudomonas aeruginosa (17.6%) and Staphylococcus aureus (11.8%) were the most common pathogens isolated. MDR pathogens represented 85.3% of the isolated organisms as detected by disk diffusion method. Nine isolates (33.3%) of Enterobacteriaceae were ESBL producers using the combined double disc method and 13 isolates (48.1%) were carbapenem resistant Enterobacteriaceae (CRE).

Conclusion: VAP represents a considerable health problem in our setting. Gram negative bacteria causing VAP are common, with the emergence of MDR Acinetobacter baumannii, Klebsiella pneumoniae, Pseudomonas aeruginosa as common pathogens causing VAP.

Bacterial etiology and antimicrobial susceptibility of isolates causing sepsis in neonates admitted to neonatal intensive care unit in Ain Shams University Hospital

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Background: Neonatal sepsis is one of the major causes of morbidity and mortality among the newborns in the developing world. Its early diagnosis is very important but very difficult.

Aim: To identify the bacterial etiology of neonatal sepsis in Neonatal Intensive Care Unit (NICU) in Ain Shams University Hospitals.

Materials and Methods: Ninety blood samples were collected from suspected neonates to have sepsis based on clinical & laboratory criteria (elevated CRP) for doing blood culture and isolated pathogen was identified by conventional Methods and antibiotic susceptibility was done according to CLSI, 2017.

Results: This study revealed 30 out 90 samples were positive (33.3%). The rate of isolated Gram negative pathogens were (40%) Klebsiella spp followed by Escherichia coli (10%), Pseudomonas aeruginosa (6.6%) and least was Acinetobacter baumannii (6.6%) and the rate of Gram positive pathogens were Staphylococcus aureus (20%) followed by Staphylococcus epidermidis (10%), and least was Enterococcus faecalis (6.6%). The antibiotic resistance was high among gram-negative isolates than gram positive.

Conclusion: The most common cause of neonatal sepsis is Klebsiella spp which is almost resistant to first line antibiotics (Ampicillin, Gentamicin and Amikacin). Routine bacterial surveillance and the study of their resistance pattern is important to implement antibiotic policy to prevent emergence of resistant strains in NICU.