

Detection of plasmid–mediate AmpC genes and evaluation the synergistic effect of clove volatile oil and antibiotics in clinical isolate of klebsiella pneumoniae in Iraq.

Mohammed O. Ibrahim and Safaa A. L. Al Meani

Biochemical and cellular archives • ISSN 0972-5075

. Vol. 19, No. 2, pp. 4053-4061, 2019

ABSTRACT :

Klebsiella pneumoniae is an important multidrug-resistant (MDR) pathogen affecting humans and a major source for hospital infections associated with high morbidity and mortality due to limited treatment options. AmpC β -lactamases are clinically significant because they may confer resistance to penicillins, cephalosporins, oxyimino-cephalosporins (e.g., ceftriaxone, cefotaxime and ceftazidime), cephamycins (e.g., cefoxitin and cefotetan) and monobactams. AmpC β -lactamase activity is not affected by ESBL inhibitor clavulanic acid. Investigating of occurrence of Plasmid-Mediated AmpC β -lactamase genes in Klebsiella pneumoniae isolated from different clinical sources in Al Anbar city and study the synergistic effect of clove Volatile oil with antibiotic (ceftazidime, ceftriaxone and Cefepime). From July 2018 to December 2018, 100 samples were collected from Al Anbar city hospitals, these samples included: wound swab, urine, abscesses and burns. AmpC β -lactamase Klebsiella pneumoniae were analyzed for the presence of AmpC production. Three phenotypic AmpC confirmation assays (AmpC E test, Ceftazidime -cloxacillin double-disk synergy test (CC-DDS) and Modified cephalosporinase (in activation Methods) were able to detect the majority of AmpC-positive strains correctly. Molecular detection of plasmid-mediated AmpC genes (blaMOX, blaCIT, blaDHA, blaFOX and blaACC) by using multiplex PCR was done. the synergistic effect of clove Volatile oil was detected using the checkerboard technique. The present study showed a high resistance of Klebsiella pneumoniae to Ceftriaxone (78%), Cefpodoxium (68%), Ceftazidimim (62%), Cefepime (62%) and Cefoxintin (16%). (CC-DDS) test were positive for 18(69.22%), (mCIM) 26(100%), AmpCE testing 24 (92.30%). Molecular screening appeared many isolates harbor AmpC genes, blaFOX11 (42.3%), blaACC8 (30.7%), blaDHA 8 (30.7%), blaCIT 9(34.6%) and blaMOX 7 (26.92%). The last two genes are the first time discovered in Iraq in this study. Clove volatile oil exhibited markedly antibacterial activity and have inhibitory effect to AmpC β -lactamase. Clove Volatile oil exhibited synergistic effect when combined with (Ceftazidimim, Cefepime and Ceftriaxone). There is high resistance to third and fourth generation of Cephalosporins among AmpC-producing Klebsiella pneumonia isolates which has been increasingly recognized in Al Anbar hospitals. Thus, molecular identification of the genes encoding AmpC would be essential for a reliable epidemiological investigation of their transmission in hospitals. The combination of clove volatile oils with antibiotic (Cefepime, ceftazidime and ceftriaxone) against Klebsiella pneumonia showed effectiveness and could improve the susceptibility of bacteria toward these antibioticsto treat the infections resulted from drug-resistant bacteria.

Key words : Klebsiella pneumonia, clove volatile oil, synergism, AmpC β -lactamases
