Therapy and prevention of nosocomial infections caused by MDR strains

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ABSTRACT: *Syzygium aromaticum* belongs to the family Myrtaceae, is an aromatic tree, originally from Indonesia used as a condiment. Property antibacterial, antifungal and anthelmintics are known from ancient. A total of 80 strains of Gram negative and Gram positive MDR from nosocomial infections were tested for virulence factors ESBL and soluble virulence factors in specific medium. Ethanolic extracts and essential oil of clove were tested for antibacterial activity against these strains. The active compounds of *S. aromaticum* buds were identified by GC-MS. Eugenol was predominantly compound, accounting for 87% of the total weight. The extracts were action against all strains concentration ranging between 62.5 µl/ml and 7.8 µl/ml.

MATERIALS AND METHODS: Gram negative and Gram positive strains isolated from nosocomial infections were acquired from the hospital Theodor Burchele Bucures. Antibitotic resistance was made with disc-diffusion method. To test the virulence factors genotypic resistance to β-lactam antibiotics, we used PCR method. Phenotypic resistance factors (exotoxinsandpore-forming enzymes) were tested on specific growth media.For testing the antimicrobial activity of extracts of ethanol (in the ratio 1:4), and oil of clove (in a ratio of 1: 1 DMSO), we used the disc diffusion method according to the protocol. The minimum inhibitory concentration (MIC) was made by decimal dilutions in 96-well plates in BHI medium. Gas chromatograph used to identify compounds in the extracts of clovewas Fisons Instruments GC 8000 coupled with mass spectrometer ionization quadrupole analyzer impact, pattern MD 800 ionization energy was 70 V.

RESULTS AND DISCUSSION: bla_{TEM} was detected for 12 strains (10 *E. coli* and 2 *E. faecalis*) bla_{CTX-M} has been detected for 29 strains (18 *E. coli*, 1 *A. baumannii* 8 *K. pneumoniae*, 1 *E. faecalis* and 1 *Proteus miserabilis*) bla_{IMP} for a strain (*Ps. aeruginosa*) and bla_{OXA48} for 5 strains of *K. pneumoniae*. High resistance to carbapenems showed strains of *Ps. aeruginosa*. *A. baumannii*, *A. faecalis, K. pneumoniae* and *E. coli.* had resistance for IV generation cephalosporins. 60.25% of the bacteria tested showed one or more soluble virulence factors. Out of 80 strains showed 80% ESBL virulence factors, 40.65% pore forming 58.31% of exotoxins and 71.29% adhesion to the substrate. By GC-MS were identified several compounds, of which 4 had greater significance. MIC values are between 7.8 ml /ml for ethanolic extracts and 6.25 ml / ml for oil extracts of *S. aromaticum.*

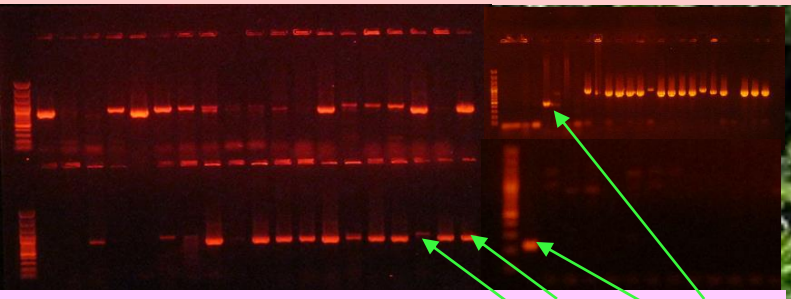

Fig.1 Genotipic virulence factors: β-lactamases TEM , CTX-M, IMP, OXA48

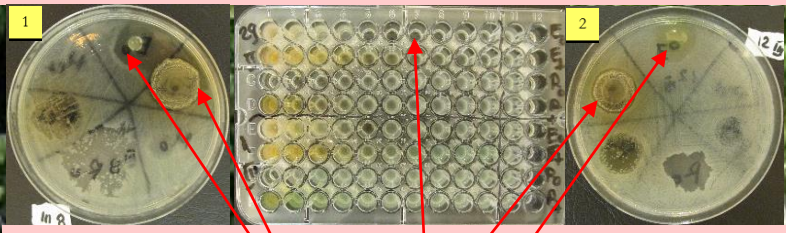

Fig.2 Antibacterial calitativ activity and MCI of ethanol and oil extract of cloves against *Klebsiella pneumonia* (1) and *Escherichia coli* (2)

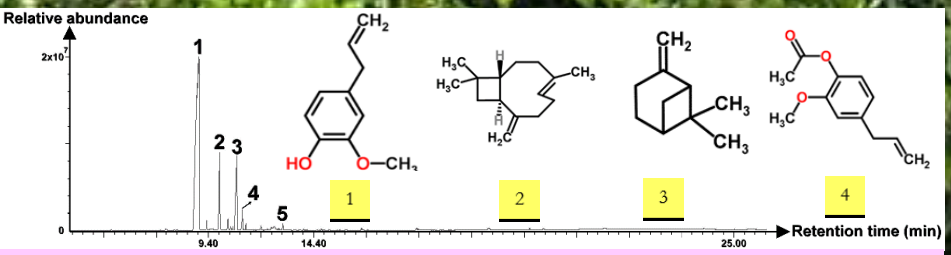

Fig.4 Chromatograme of essential oil of *S. aromaticum*: 1=eugenol (87%), 2=caryophyllene (4.87%), 3=acetyl eugenol (2.11%), 4=β–pinen (0.82%)

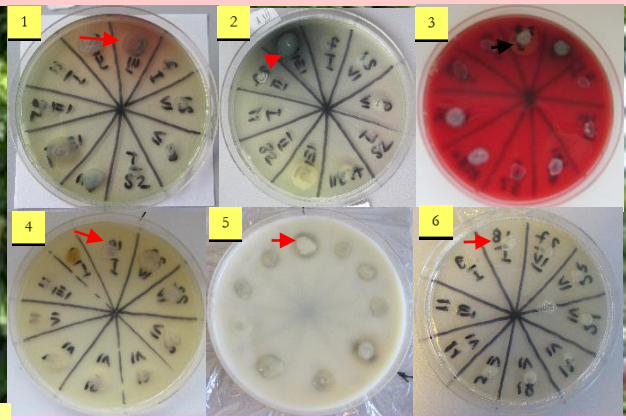

Fig.3 Fenotipic virulence factors: DN-ase(**1**), gelatinase (**2**), haemolysis(**3**), lecitinază(**4**), cazeinază(**5**) and lipase (**6**).

CONCLUSION: The antibacterial activity against Gram negative and Gram positive strains of ethanolic and oil extracts of *S. aromaticum* proved concerted activity of terpenes, izoflavonoids, poliphenols and volatile oils. Ethanolic extracts and essential oil can be used successfully in infections caused by bacteria with resistance to β-lactams.

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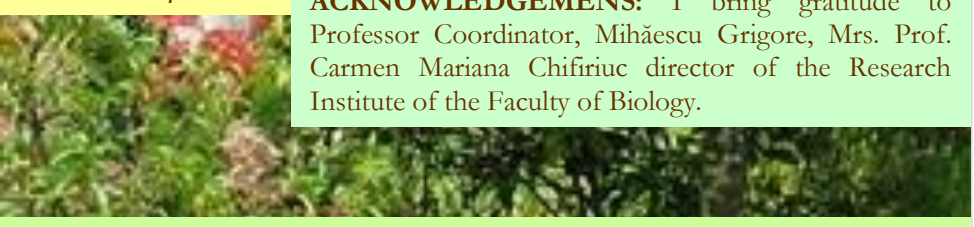

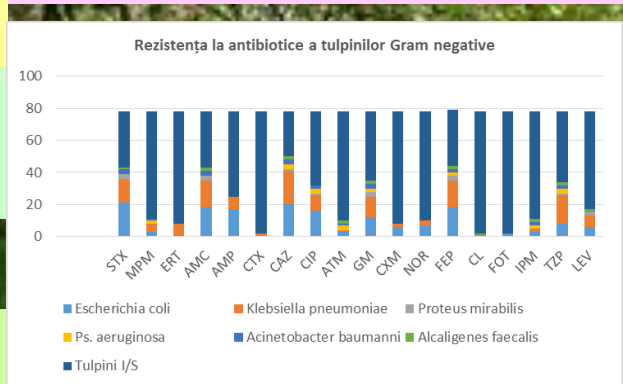

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