SUMMARY

Pseudomonas aeruginosa is a common pathogen that causes nosocomial infections in intensive care units. Resistant *P. aeruginosa* is an emerging threat to patients. With the rising spread of antibiotic-resistant organisms, clinical laboratories must focus more and more on the epidemiology of hospital-acquired infections. Strain typing is an extremely useful tool in tracking the spread of nosocomial infections.

In the present study we try to elucidate the epidemiology of *Pseudomonas aeruginosa* in the adult ICU. Several patient and environmental samples from Benha University adult ICU have been typed using RAPD and ERIC-PCR to investigate possible relationships. Antibiogram was performed as a typing method and the antibiotic susceptibility tests included testing for extended spectrum beta lactamses and metallo-β-lactamase production.

The result of the study showed the following:

50% of patient samples were positive for *Pseudomonas aeruginosa*, and the highest rate of *Pseudomonas* isolation was from sputum samples (62%).

33% of the environmental samples were positive for *Pseudomonas aeruginosa*. Highest frequencies of *Pseudomonas* isolation were from Ambu bags (100%), stethoscope (100%), suction apparatus tubing (100%), water tap/sink (80%) and floor (75%).

13% of staff hand samples were positive for *Pseudomonas aeruginosa*.

Metallo beta lactamase production was tested for by Meropenem-EDTA double-disk synergy test and E-Test MBL, both tests gave equivalent results. MBL production was highest in patient strains (92%), less in environmental strains (19%) and was not detected in staff hand strains. The difference in MBL distribution

between patient and environmental/staff samples was statistically significant ($P < 0.001$).

There was clear difference in antibiotic resistance between MBL producing *Pseudomonas* and non MBL producing *Pseudomonas*. The former was much more resistant to all antibiotics tested. The only exception was CT (colistin) to which nearly all *Pseudomonas* strains (both MBL and non-MBL producing strains) were sensitive.

The isolated *Pseudomonas aeruginosa* strains showed 7 antibiotic sensitivity patterns that were designated A1-A7. The antibiotic sensitivity patterns range from pattern A1 which is sensitive to all tested antibiotics to pattern A7 which is resistant to all tested antibiotics except colistin.

All the *Pseudomonas aeruginosa* isolates were typable by RAPD method. Seven RAPD patterns (RAPDI-RAPDVII) were obtained, consisting of 2 to 7 bands ranging from 200 bp to 2000 bp.

ERIC-PCR yielded 1 to 5 amplification bands. The size of amplified DNA bands ranged from 75 bp to 7000 bp. All the 60 isolates were typable by this method. Eight ERIC patterns were obtained (ERICI-ERICVIII).

ERIC typing method gave higher discriminatory index (0.7955) than RAPD (0.7706), still the combination of both gave the highest discriminatory index (0.7977). Antibiogram gave the lowest discriminatory index (0.7232).

Water-tap and suction apparatus played a central role in the spread of *Pseudomonas aeruginosa* in the ICU. Water-tap had had established molecular epidemiological relations with staff hands and artificial ventilation fluid reservoir. Suction apparatus was epidemiologically linked to medical trays and stethoscope.

Both water-tap and suction apparatus were epidemiologically linked and both had been epidemiologically linked to patients.

Epidemiological linkage has been also proved between patients and artificial ventilation tubing.

The patient MBL-producing strains were epidemiologically linked to water tap and suction apparatus tubing.