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Serotypes and antimicrobial resistance of invasive *Streptococcus pneumoniae* isolates from East Algeria (2006-2014)

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Introduction

Streptococcus pneumoniae **is one of the most common bacterial causes of morbidity and mortality worldwide causing life threatening infections such as meningitis, pneumonia and bacteremia. Antibiotic resistance in *S.pneumoniae* has increased worldwide but there are few data in Algeria and more information is needed about serotype distribution of invasive *S.pneumoniae* isolates. The resistance of *S. pneumoniae* to antibiotics is gradually becoming a serious problem, which underlines the urgent need for vaccines to control pneumococcal diseases.**

Methods

From 2006 to 2014, a total of 123 non-duplicate invasive *S. pneumoniae* isolates were identified at the university hospital from East Algeria . Isolates were obtained from cerebrospinal fluid (CSF), blood and pleural fluid and when an isolate was recovered from CSF and blood, it was categorized as meningitis. Bacterial strains were grown on Columbia sheep blood Agar and incubated at 37°C under a 5% CO_2 atmosphere for 20–24 hours. All isolates were originally identified as *S.pneumoniae* based on colony morphology, Gram staining, α-hemolysis and optochin susceptibility. Antibiotic resistance was determined by the Clinical and Laboratory Standards Institute (CLSI) disk diffusion test. A total of 11 antibiotics were tested including oxacillin (screening) , erythromycin, clindamycin/lincomycin, tetracycline , chloramphenicol , cotrimoxazol , vancomycin , rifampicin , levofloxacin, ciprofloxacin and linezolid. The minimum inhibitory concentration of beta-lactams (Penicillin, Amoxicillin, Cefotaxim, Imipenem) and erythromycin were determined using the E test method (AB BIODISK). One hundred serotypes were determined by agglutination by latex particles and/or by the Neufeld test using monovalent antisera (Statens Serum Institute).

Results

Table 1. Distribution of 123 pneumococcal strains according to type of sampling and age

SAMPLE	≤5Years	6 to 17Years	18 to 40Years	>41Years	TOTAL
CSF	33	14	23	8	78
CSF+BLOOD	0	3	8	3	14
BLOOD	7	2	6	12	27
PLEURAL FLUID	0	0	0	4	4
TOTAL	40	19	37	27	123

Figure 1. Rates of resistance to 13 antibiotics (123 strains)

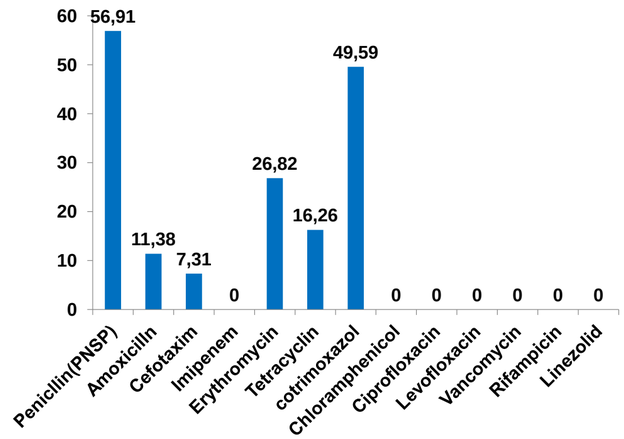


Figure 2. MICs (µg/ml) of 123 pneumococcal isolates for penicillin, amoxicillin and cefotaxim

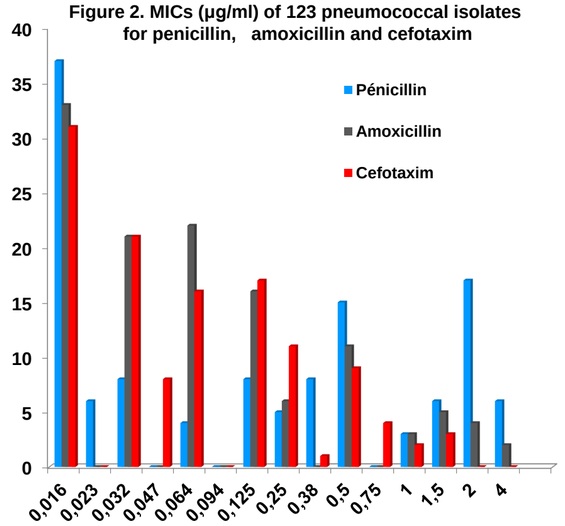


Figure 3. Serotype distribution of 100 pneumococcal isolates

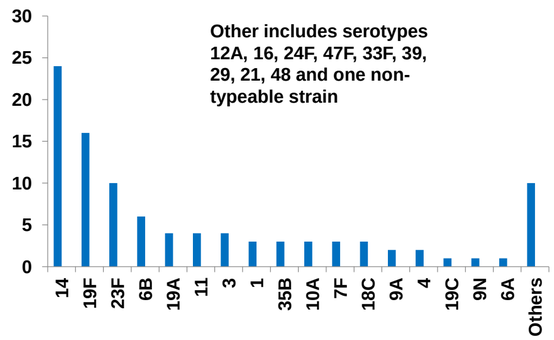
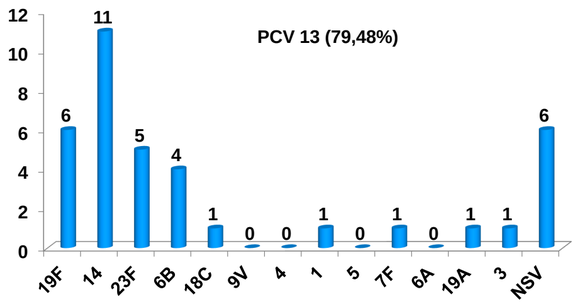


Figure 4 . Distribution of serotypes in children ≤5 years of age and vaccine coverage (n=31/39)



Conclusions

Among the 123 isolates, 56.9% were non-susceptible to penicillin (PNSP), 39.83% intermediate and 17.07% resistant (MIC range 2-4 µg/ml). Resistance rates to other antibiotics: erythromycin (26.82%) tetracycline (16.26%), cotrimoxazol (49.59%).

All the strains were susceptible to chloramphenicol, vancomycin and levofloxacin.

The predominant serotypes were 14 (24%), 19F(16%), 23F (10%), and 6B (6%) accounting for 56% of tested strains.

Non-penicillin susceptibility was associated with serotype 14 (29.03%), 19F (17.74%), 23F (9.67%) and 6B (6.45%).

In children ≤ 5 years of age, the rate of this serotypes were 14 (28.20%), 19F (15.38%), 23F (12.82%) and 6B (10.25%).

Pneumococcal vaccination is not compulsory in Algeria.

The theoretical coverage of PCV13 added up to 80%.

Continual surveillance of antibiotic susceptibility and serotype distribution is recommended in order to plan future treatment and preventive strategies.

Our results suggested that the expanded coverage offered by PCV13 will provide additional protection against pneumococcal diseases in Algeria.

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