

Antimicrobial susceptibility and resistance of non-aeruginosa pseudomonas spp., west general hospital, caracas, venezuela (1997-2003) Non-Aeruginosa Pseudomonas Spp Drug Resistance

La susceptibilidad y resistencia antimicrobiana de las pseudomonas no aeruginosas ssp; hospital general del oeste, caracas, venezuela (1997 - 2003)*

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Abstract

Objective: To investigate the antimicrobial resistance among non-fermenting gram-negative bacilli, particularly, non-aeruginosa *Pseudomonas* species. Significance: Surveillance of this pathogens, because the antimicrobial resistance among nonfermenting gram-negative bacilli has increased significantly in Venezuela in recent years. Study: We evaluated non-aeruginosa *Pseudomonas* species strains isolates collected from patients with suspected infections in a hospital of Caracas, Venezuela (West General Hospital) between 1997–2003. Study population: For the studied period, 146 clinical strains of non-aeruginosa *Pseudomonas* species were isolated, we consider also in this analysis related species: *Burkholderia*, *Stenotrophomonas*, *Flavimonas*, *Sphingomonas*, *Ralstonia* and *Comamonas*. Methodology: Clinical samples were processed and identified with standard cultures and biochemical tests. In vitro antimicrobial susceptibility of the isolates was assessed by an agar disk diffusion method using Mueller-Hinton agar as recommended by the National Committee for Clinical Laboratory Standards (NCCLS). Isolates were tested against 15 drugs: imipenem, meropenem, aztreonam, piperacillin, tobramycin, amikacin, gentamicin, ceftazidime, cefepime, netilmicin, cefoperazone, ciprofloxacin, levofloxacin, lomefloxacin, ofloxacin. Epi Info v.6.0 was used in statistical analysis. Results: From total isolated strains, 50.7% corresponded to *Stenotrophomonas maltophilia*, 21.2% to *Burkholderia cepacia*, 17.8% to *P. fluorescens*, 4.1% to *P. putida*, 1.4% to *P. stutzeri*, 1.4% to *Flavimonas oryzihabitans*, 1.4% to *Sphingomonas paucimobilis*, 1.4% to *Ralstonia pickettii*, 0.7% to *P. mendocina*, 0.7% to *Comamonas testosteroni*. *S. maltophilia* showed high resistance to carbapenemes (100% of resistance to imipenem and meropenem), and a considerable susceptibility to certain quinolones (63.6% of susceptibility to ciprofloxacin and 95.% to levofloxacin). *B. cepacia* displayed higher resistance to gentamicin (58.3%) and high susceptibility levels to carbapenems (80.0% to meropenem and 88.5% to imipenem). *P. fluorescens* showed high resistance to piperacillin and gentamicin (55.6% and 47.8% respectively) and high

susceptibility to quinolones (72.7% for ofloxacin, 73.9% for ciprofloxacin and 80.0% to lomefloxacin). *P. putida* showed higher resistance for amikacin and ciprofloxacin (50%, both). Conclusions: The high rates of antimicrobial resistance among these bacterial pathogens in this hospital are important. Judicious use of antimicrobial agents can never be overemphasized. Continued surveillance of the changes of resistance patterns over time is necessary.

Key Words: Non-aeruginosa *Pseudomonas* spp, antimicrobial, resistance.

Resumen

El objetivo del presente estudio fue evaluar la resistencia antimicrobiana de bacilos gram-negativos no fermentadores, particularmente especies de *Pseudomonas* no aeruginosa. Esto tiene gran relevancia dado el incremento de la resistencia de dichos patógenos en el país. El estudio se realizó con muestras tomadas de pacientes con infecciones del Hospital General del Oeste, de Caracas, Venezuela entre 1997–2003. En dicho período, 146 cepas clínicas de especies de *Pseudomonas* no aeruginosa fueron aisladas, en el análisis se incluyeron: *Burkholderia*, *Stenotrophomonas*, *Flavimonas*, *Sphingomonas*, *Ralstonia* y *Comamonas*. Las muestras fueron evaluadas por el método de difusión de discos en agar de Mueller-Hinton por la técnica de Kirby-Bauer, de acuerdo a las pautas de la NCCLS. Las cepas fueron probadas contra 30 drogas. Del total de cepas aisladas, 50.7% fueron *Stenotrophomonas maltophilia*, 21,2% *Burkholderia cepacia*, 17,8% *P. fluorescens*, 4,1% *P. putida*, 1,4% *P. stutzeri*, 1,4% *Flavimonas oryzae*, 1,4% *Sphingomonas paucimobilis*, 1,4% *Ralstonia pickettii*, 0,7% *P. mendocina*, 0,7% *Comamonas testosteroni*. *S. maltophilia* mostró alta resistencia a los carbapenems (100% de resistencia a imipenem y meropenem), y una considerable sensibilidad a ciertas quinolonas (63,6% a ciprofloxacin y 95% a levofloxacin). *B. cepacia* mostró alta resistencia a gentamicina (58,3%) pero alta sensibilidad a carbapenems (80,0% meropenem y 88,5% imipenem). *P. fluorescens* mostró alta resistencia piperacilina y gentamicina (55,6% y 47,8% respectivamente) y alta sensibilidad a quinolonas (72,7% ofloxacin, 73,9% ciprofloxacin y 80,0% lomefloxacin). Las altas tasas de resistencia antimicrobiana entre los aislados evaluados en este hospital son relevantes. Uso juicioso de antimicrobianos, por ende, debe ser sobre-enfatizado. Así mismo, la vigilancia continua en los cambios de patrones de resistencia en el tiempo es necesaria.

Palabras claves: *Pseudomonas* spp No-aeruginosa, antimicrobianos, resistencia.

Introduction

In the last decade, a remarkable increase in the incidence of nosocomial Gram-negative infections has been observed. These pathogens represent a substantial problem in clinical practice, due to the high resistance profile of most commonly used antibiotics. (1)

Stenotrophomonas maltophilia and other related organisms have become as important nosocomial pathogens, especially in immunocompromised patients in many countries of the world. (2)

For these reasons antimicrobial drug resistance patterns of these organisms are constantly needed. In this study we evaluated susceptibility in vitro profiles for *Stenotrophomonas maltophilia*, *Burkholderia cepacia*, *Pseudomonas fluorescens*, among others non-aeruginosa *Pseudomonas* spp.

Objectives of this study was to investigate the antimicrobial resistance among non-fermenting gram-negative bacilli, particularly, non-aeruginosa *Pseudomonas* species. The significance of this, is related to the fact, that surveillance of this pathogens, because the antimicrobial resistance among non-fermenting gram-negative bacilli has increased significantly in Venezuela in recent years.

Materials y Methods

Study: We evaluated non-aeruginosa *Pseudomonas* species strains isolates collected from patients with suspected infections in a hospital of Caracas, Venezuela (West General Hospital) between 1997–2003.

Setting: Urban general hospital of Caracas, Venezuela (West General Hospital) between 1997–2003.

Study population: For the studied period, 146 clinical strains of non-aeruginosa *Pseudomonas* species were isolated, we consider also in this analysis related species: *Burkholderia*, *Stenotrophomonas*, *Flavimonas*, *Sphingomonas*, *Ralstonia* and *Comamonas*.

Methodology: Clinical samples were processed and identified with standard cultures and biochemical tests. In vitro antimicrobial susceptibility of the isolates was assessed by an agar disk diffusion method using Mueller-Hinton agar as recommended by the National Committee for Clinical Laboratory Standards (NCCLS) (now Clinical and Laboratory Standards Institute, CLSI).(3) Isolates were tested against 15 drugs: imipenem, meropenem, aztreonam, piperacillin, tobramycin, amikacin, gentamicin, ceftazidime, cefepime, netilmicin, cefoperazone, ciprofloxacin, levofloxacin, lomefloxacin, ofloxacin. Beta-lactamases inhibitors were not tested in this study.

Results and Discussion

From total isolated strains, 50.7% corresponded to *Stenotrophomonas maltophilia*, 21.2% to *Burkholderia cepacia*, 17.8% to *Pseudomonas fluorescens*, 4.1% to *Pseudomonas putida*, 1.4% to *Pseudomonas stutzeri*, 1.4% to *Flavimonas oryzihabitans*, 1.4% to *Sphingomonas paucimobilis*, 1.4% to *Ralstonia pickettii*, 0.7% to *Pseudomonas mendocina*, 0.7% to *Comamonas testosteroni*.

Stenotrophomonas maltophilia showed high resistance to carbapenems (100% of resistance to imipenem and meropenem), and a considerable susceptibility to certain quinolones (63.6% of susceptibility to ciprofloxacin and 95.5% to levofloxacin) (Graphic 1).

Burkholderia cepacia displayed higher resistance to gentamicin (58.3%) and high susceptibility levels to carbapenems (80.0% to meropenem and 88.5% to imipenem) (Graphic 2).

Pseudomonas fluorescens showed high resistance to piperacillin and gentamicin (55.6% and 47.8% respectively) and high susceptibility to quinolones (72.7% for ofloxacin, 73.9% for ciprofloxacin and 80.0% to lomefloxacin) (Graphic 3).

Pseudomonas putida showed higher resistance for amikacin and ciprofloxacin (50%, both).

Conclusiones

Non-fermentative gram-negative bacilli are still a major concern, especially in compromised individuals. *Stenotrophomonas maltophilia* (previously *Pseudomonas* and *Xanthomonas maltophilia*) and *Burkholderia cepacia* (previously *Pseudomonas cepacia*), among others, are also of substantive concern because of their similar high intrinsic resistances to antibiotics.(4) The basis for the high intrinsic resistance of these organisms is the lower outer-membrane permeability of these species, coupled with secondary resistance mechanisms such as an inducible cephalosporinase or antibiotic efflux pumps, which take advantage of low outer-membrane permeability.(4,5)

The high rates of antimicrobial resistance among these bacterial pathogens in this hospital are important. Judicious use of antimicrobial agents can never be overemphasized. Continued surveillance of the changes of resistance patterns over time is necessary.

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Graph 1. Antimicrobial drug susceptibility (%) of *Stenotrophomonas maltophilia* against tested antibiotics (WGH, Venezuela, 1997-2003). Legend: %S, proportion of susceptible strains; %I, proportion of strains with intermediate susceptibility; and %R, proportion of resistant strains.

Grafico1

Graph 2. Antimicrobial drug susceptibility (%) of *Burkholderia cepacia* against tested antibiotics (WGH, Venezuela, 1997-2003). Legend: %S, proportion of susceptible strains; %I, proportion of strains with intermediate susceptibility; and %R, proportion of resistant strains.

Grafico2

Graph 3. Antimicrobial drug susceptibility (%) of *Pseudomonas fluorescens* against tested antibiotics (WGH, Venezuela, 1997-2003). Legend: %S, proportion of susceptible strains; %I, proportion of strains with intermediate susceptibility; and %R, proportion of resistant strains.

Grafico3

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