

## **Dedication**

To the souls of my father and brother Ballal ...

To my mother and my wife

## Acknowledgements

First of all thanks for ALLAH for giving me the power and willing to complete this study. After that I would like to express my sincerest gratitude to my supervisor Dr. Humodi Ahmed Saeed, Dean College of Medical Laboratory Science, Sudan University of Science and Technology for his patience with me and for supporting me till I had finished this work. I knowledge with special appreciation the assistance of my colleague the medical laboratory technologist Ibrahim Ali Alhaj, the man who used to help and support every one need to go forward. Thanks extended to the staff of bacteriology laboratory, National Health Laboratory, Military Hospital and Khartoum Teaching Hospital where I had received a considerable assistance.

## Abstract

This study had been carried out in Khartoum state during the period between December 2003 to May 2005. The study was designed to evaluate the *in vitro* activity of routine used antipseudomonal antimicrobials (Gentamicin, Ciproflaxacin, Ceftazidime, Amikacin, and Imipenem), by using NCCLS Modified Kirby – Bauer Disc Diffusion Technique against *Pseudomonas aeruginosa* strains isolated from ninety one clinical specimens, included , wound swabs (n=60) 66% ,ear swabs (n=25) 27%, and urine (n=6) 7%. Males were 67/91 (74%) and females were 24/91 (26%). The cases were designed into five age-groups, 1-15 years contained 17/91 (19%) cases, 16-30 years contained 23/91 (25%) cases, 31-45 years contained 16/91 (17%) cases, 46-60 years contained .18/91 (20%) cases and  $\geq$  61 years contained 17/91(19%) cases

The results obtained from this study showed that the most effective antimicrobial among the antimicrobials used was Imipenem , because it had had the lowest resistance rate 1/91(1%). The resistance rate of Amikacin, Ceftazidime, Ciprofloxacin and Gentamicin, were 4/91 (4%), 13/91 (14%), 27/91 (30%) and 32/91 (35%) respectively.

Forty eight (53%) of the strains were sensitive to all antimicrobials under test.

The study proved that, resistance to antimicrobials among males was greater than that among females. Resistance to Gentamicin among males was 25/67 (37%) whereas among females was 07/24 (29%), to Ciprofloxacin among males was 24/67 (36%) and among females was 3/24 (13%), to ceftazidime among males was 10/67 (15%) and among females was 3/24 (13%). All the resistant strains (4) to Amikacin were among males, and the only single resistant strain to Imipenem was among males.

The study also concluded to that; males 67/91(74%) were more exposure to infection by *P. aeruginosa* than females 24/91 (26%). Those who fell in the age-group 16-30 years 23/91 (25%) were more liable to be infected by *P. aeruginosa*, but those who were among age-group 31-45 years .16/91 (17%) were less liable

## ملخص الأطروحة

تم تنفيذ هذه الدراسة في ولاية الخرطوم في الفترة من ديسمبر عام 2003م وحتى مايو عام 2005م. صممت هذه الدراسة لتقدير فاعلية المضادات الحيوية المستخدمة روتينياً لعلاج الالتهابات المسببة بكتيريا الزائفة الزنجارية. المضادات الحيوية موضوع الدراسة هي الجنتاميسين والسيروفلوكوكساسين والسيفتازيديم والإميكايسين والأمبينيم. تم عزل سلالات من بكتيريا الزائفة الزنجارية من عينات طبية شملت مسحات لجروح ملتهبة (60 عينة) وتمثل 66%, مسحات لآذان ملتهبة (25 عينة) وتمثل 28%, ثم عينات للبول (6 عينات) وتمثل 7%. استخدمت طريقة كيربي - بور لعمل اختبارات الحساسية لمعرفة كفاءة المضادات الحيوية المستخدمة في الدراسة.

في هذه الدراسة الذكور يمثلون 67/91 (74%) والإإناث يمثلن 24/91 (26%). تم تصنيف الحالات موضوع الدراسة إلى خمس فئات عمرية. الفئة العمرية الأولى ضمت الأعمار من سن سنة وحتى 15 سنة واحتوت على 17 فرد وتمثل 19%, الفئة الثانية ضمت الأعمار من سن 16 سنة وحتى 30 سنة واحتوت على 23 فرداً وتمثل 25%. الفئة الثالثة ضمت الأعمار من 31 سنة وحتى 45 سنة واحتوت على 16 فرداً وتمثل 17%, الفئة الرابعة ضمت الأعمار من 46 سنة وحتى 60 سنة واحتوت على 18 فرداً وتمثل 20%, الفئة العمرية الخامسة والأخيرة ضمت الأعمار من 61 سنة فاكثر واحتوت على 17 فرداً وتمثل 19%.

النتائج المستخلصة من هذه الدراسة بينت أن الأمبينيم هو أكثر المضادات الحيوية كفاءة لأنه يملك أقل معدل للمقاومة تجاه السلالات موضوع الدراسة وهو 1/91 و يمثل 1% أما معدلات المقاومة للأميكايسين والسيفتازيديم والسيروفلوكوكساسين والجنتاميسين فهي 4/91 (4%), 13/91 (14%), 27/91 (30%), 32/91 (35%) على التوالي.

أثبتت الدراسة أن 48 (53%) سلالة حساسة لكل المضادات الحيوية موضوع الدراسة.

انتهت الدراسة إلى أن معدل المقاومة للمضادات الحيوية وسط الذكور أعلى منه وسط الإناث، حيث أن معدل المقاومة

للجنتاميسين وسط الذكور 25/67 (37%) ووسط الإناث 7/24 (%29) ومعدل المقاومة للسيروفلوكساسين وسط الذكور 24/67 (%36) وللإناث 3/24 (%13) ومعدل المقاومة للسيفتازيديم للذكور 10/67 (%15) وللإناث 3/24 (%13). أما السلالات المقاومة للاميكاسين وعددها 4 فقد كانت وسط الذكور والسلالة الوحيدة المقاومة للامبيينيم فقد كانت أيضاً وسط الذكور. كذلك خلصت الدراسة إلى أن الذكور 67/91 (%74) هم أكثر عرضة للإصابة ببكتيريا الزائفة الزنجارية من الإناث 24/91 (%26). أيضاً خلصت الدراسة إلى أن الفئة العمرية 16-30 سنة و تمثل 23/91 (%25) هي أكثر الفئات عرضة للإصابة ببكتيريا الزائفة الزنجارية ، بينما أقل الفئات عرضة للإصابة هي الفئة 45-31 بمعدل 16/91 (%17).

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## Preface

For a long time after the discovery of the antibiotics, the bacterial infections, had been under a good control. But the emergence of resistant strains to antimicrobials complicate the bacterial infections and create a challenge need to collect all efforts to be ready for a future promise for facing multidrug – resistant strains .

The problem will be more complicated if the infectious agent is *Pseudomonas aeruginosa* owing to its innate (intrinsic) resistance to a number of antimicrobials and its liability to acquire resistance to routine used antipseudomonals, especially in the developing countries, where, the overuse and misuse of antimicrobials is frequent. To solve this problem intensive studies should be performed to trace and find the resistant strains of the infectious bacteria, in order, to know their mechanism of resistance and the way by which they can acquire the resistance to certain drug. Trials should be carried out in the field of the antimicrobials to improve the efficacy of the present antimicrobials and to discover new ones. Above all bacteriology laboratories in the developing countries should be provided with the facilities that assist in quick diagnosis and perfect susceptibility testing.