

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(الْحَمْدُ لِلَّهِ رَبِّ الْعَالَمِينَ)

صدق الله العظيم

سورة الفاتحة: الآية (1)

DEDICATION

To my dear parents

To my extended family

To my teachers and colleagues

ACKNOWLEDGEMENT

Thank ELMIGHTY ALLA for giving me patience and health to finish this work.

I would like to express my deep and sincere gratitude and appreciation to Prof. Humodi Ahmed Saeed for his encouragement, patience, guidance and supervision during preparation and revision of this dissertation.

It is a pleasure to acknowledge the working staff in Omderman Teaching Hospital for their contribution.

Thanks are extended to the staff of Research Laboratory, Sudan University of Science and Technology, specially Miss. Suhair Ramadan.

Finally, I would like to thank every body who positively contribute in finalizing this dissertation.

ABSTRACT

β -lactam antibiotics are important antibiotics which are used for treatment of staphylococcal infections. The objective of this study was to assess β -lactamase produced by staphylococci isolated from clinical specimens.

A total of 100 isolates of staphylococci were obtained from Omderman Teaching Hospital. The isolates were rechecked by Gram's stain and biochemical tests. Presence of β -lactamases in these isolates were evaluated by iodometric and chromogenic cephalosporin tests.

Staphylococci were found to be 97 *Staphylococcus aureus* and 3 *Staphylococcus epidermidis*. Study on assessment of β -lactamases produced by these isolates revealed that out of 100 staphylococci, 78 (78%) and 92 (92%) were β -lactamase producers when screened by iodometric method and chromogenic cephalosporin method respectively.

The study concluded that the chromogenic cephalosporin method is considered as golden standard method for detection of β -lactamase enzyme in staphylococci. Further studies with other *Staphylococcus* species are required to validate these results.

الخلاصة

مضادات البييتالاكتام من أهم المضادات الحيوية التي تستخدم لعلاج الأمراض التي تسببها المكورات العنقودية.

الهدف من هذه الدراسة تقويم انزيمات البييتالاكتام عند المكورات العنقودية المعزولة من العينات الإكلينيكية وقد استخدمت 100 عينة من المكورات العنقودية من مستشفى امدرمان التعليمي.

هذه العينات المعزولة اجري عليها صبغة جرام والإختبارات البيوكيميائية وقد أجرى اختبار iodometric method , و chromogenic cephalosporin method لهذه العينات المعزولة لمعرفة وجود إنزيم البييتالاكتام الذي يفرز بواسطة المكورات العنقودية.

وقد أجرى هذا الاختبار علي 97 عينة من *Staphylococcus aureus* , و3 عينات من *Staphylococcus epidermidis*

وكانت النتائج المتحصل عليها (78%) و(92%) قد افرزوا انزيم البييتالاكتام عندما اجري عليها اختبار iodometric method و chromogenic cephalosporin method .

خلاصة هذه الدراسة هي ان اختبار chromogenic cephalosporin method يعتبر هو الطريقة المثلي لتقويم انزيمات البييتالاكتام عند المكورات العنقودية.

TABLE OF CONTENTS

الآية.....	I
Dedication.....	II
Acknowledgement.....	III
Abstract.....	IV
Abstract (Arabic).....	V
Table of Contents.....	VI

CHAPTER ONE: INTRODUCTION AND OBJECTIVES

1.1. Introduction.....	1
1.2. Objective.....	3
1.2.1. General objective.....	3
1.2.2. Specific objectives.....	3

CHAPTER TWO: LITERATURE REVIEW

2.1. Beta- lactam antibiotics.....	4
2.2. Coagulase positive staphylococci.....	6
2.2.1. <i>Staphylococcus aureus</i>	6
2.3. Coagulase negative staphylococci.....	7
2.3.1. <i>Staphylococcus epidermidis</i>	7
2.3.2. <i>Staphylococcus saprophyticus</i>	8
2.4. Epidemiology.....	8

2.5. Clinical manifestation.....	8
2.6. Laboratory diagnosis.....	9
2.7. Pathogenesis.....	9
2.8. Adherence to host tissue.....	10
2.9. Invasion of host tissues.....	11
2.9.1. The α , β , δ - Toxins.....	11
2.9.2. Phospholipase C.....	11
2.9.3. Metalloproteases.....	12
2.9.4. Hyaluronidase and hyaluronate lyase.....	12
2.9.5. Exfoliative toxins.....	12
2.9.6. Epidermal cell differentiation inhibitor.....	12
2.9.7. Avoidance of host defenses.....	13
2.9.7.1. Capsular polysaccharides.....	13
2.9.7.2. Enterotoxins.....	13
2.9.7.3. Protein A.....	14
2.9.7.4. The fatty acid modifying enzyme and lipases.....	14
2.9.7.5. V8 Protease.....	14
2.9.7.6. Leukocidins.....	15
2.9.7.7. Staphylokinase.....	15
2.10. Iodometric method.....	15
2.11 Chromogenic cephalosporin method (Cefinase or Nitrocef disks).....	16

CHAPTER THREE: MATERIALS AND METHODS

3.1. Study design.....	17
3.1.1. Study area.....	17
3.1.2. Specimens.....	17

3.1.3. Sample size.....	17
3.1.4. Study duration.....	17
3.2. Collection of isolates.....	17
3.3. Laboratory Methods.....	18
3.4. Bacteriological methods.....	18
3.5. Identification of Staphylococci.....	18
3.5.1. Biochemical tests.....	18
3.5.1.1. Catalase test.....	18
3.5.1.2. Coagulase test...../.....	18
3.5.3.3. Mannitol fermentation.....	19
3.5.3.4. DNase test.....	20
3.5.3.5. Organisms tested.....	20
3.6. β -Lactamase tests.....	21
3.6.1. Iodometric method.....	21
3.6.1.1. Interpretation of results.....	21
3.6.2. Chromogenic cephalosporin mehod (Cefinase disks).....	21
3.6.2.1. Interpretation of results.....	21

CHAPTER FOUR: RESULTS

4. Results.....	23
-----------------	----

CHAPTER FIVE: DISCUSSION

5.1. Discussion.....	27
5.2. Conclusion.....	28
5.3. Recommendations.....	28
References.....	30
Appendices	35

LIST OF TABLES

Table 1. Distribution of the specimens according to site of collection	24
Table 2. Biochemical tests adopted in identification of <i>Staphylococcus</i> spp.....	25
Table 3. Shows results of iodometric and cefinase for detection of β -lactamase	26