

الآية

بسم الله الرحمن الرحيم

إِنَّ اللَّهَ لَا يَسْتَحْيِي أَنْ يَضْرِبَ مَثَلًا مَّا بَعُوضَةً فَمَا فَوْقَهَا

صدق الله العظيم

سوره البقرة: الآية 26

# **DEDICATION**

To my parents mercy of God

To my lovely and precious wife Salwa Abdel Jabar

To my lovely daughters Reem & Hla

To my deer son Tariq

To my brothers and sister

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First of all thanks to AIMIGHTY ALLAH who gave me the strength and the patience and to complete this work.

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## ABSTRACT

Typical respiratory pathogens *Streptococcus pneumoniae* (*S. pneumoniae*), *Klebsiella pneumoniae* (*K. pneumoniae*), and *Haemophilus influenzae* (*H. influenzae*) are now recognized as a significant cause of acute respiratory tract infections. These pathogens account for more than two third of all cases of community-acquired pneumonia (CAP). The organisms also occur as co-pathogens in mixed infections with mortality rate as high as 25 %. This study was essentially designed to investigate CAP among Sudanese patients acquiring infection from community in Khartoum State. Classical microbiological techniques as well as molecular technique were used achieve the objectives of the study.

A total of 360 Sudanese patients (218 males and 142 females) suspected to have CAP and attended outpatient units at different hospitals in Khartoum State were enrolled in this study. These hospitals were AL-Shaab Teaching Hospital, Khartoum North Teaching Hospital, Abu Anja Teaching Hospital and Omdurman Teaching Hospital. The patients were grouped according to their ages as follows (year); 13 to 30, 31 to 60 and 61 to 90. Sputum specimens were collected from each patient and transported to the laboratory under the standard conditions following the Guideline of National Committee for Clinical Laboratories Standards. All specimens were inoculated on an agar media and incubated overnight to isolate the causative agents. DNA was extracted from each sputum specimen by Jena bioscience kit, Germany, and then stored in -20°C until used. A set of specific

primers were used to detect the pathogens using PCR machine. Gene sequence was done for PCR product of *S. pneumoniae* to confirm the results.

The results showed 122(33.8%) of the specimens were positive for bacterial growth. The rest 238(66.2%) demonstrated no bacterial growth. Out of the investigated specimens (n=360), CAP agents were identified as follows; 64(17.8%) *S. pneumoniae*, 39(10.8%) *K. pneumoniae* and 19(5.3%) *H. influenzae*. Moreover, PCR results showed 157(43.6%) of the investigated specimens were positive, while 203(56.4%) were negative. The detected agents were *S. pneumoniae* 81(22.5%), *K. pneumoniae* 43(11.9%) and *H. influenzae* 33(9.2%). CAP agents were more prevalent in males 97(26.9%) than females 60 (16.6%), but this result was statistically insignificant. On the other hand, CAP agents were more prevalent in age group 31-60 years. This result was statistically significant only with *K. pneumoniae* ( $P= 0.041$ ). The result of the gene sequences showed that the average query cover between 74% to 100% and the identity between 92% to 100%.

The study concluded that the prevalence of CAP in Khartoum State is relatively high. *S. pneumoniae* is ranking the top of the causative agents. PCR is very useful in detection of CAP agents. *SHV* resistance genes were detected only in *K. pneumoniae*. Further studies are recommended for detection of the other bacterial species in sputum samples coupled with viral agent using PCR, especially for bacterial PCR-negative samples.

## الخلاصة

تعتبر الأنواع البكتيرية النمطية للجهاز التنفسي للأنسان مثل الم كورات العقديه لذات الرئه *Streptococcus pneumoniae* والكليبيسيلا الرئويه *Klebsiella pneumoniae* وبكتيريا المستدميه النزليه *Haemophilus influenzae* من الأسباب الرئيسية والهامة لأمراض الجهاز التنفسي الحادة.

يشكل الألتهاب الرئوي النمطي الذي تسببه هذه البكتريا اكثر من ثلثين أصابات الألتهاب الرئوي. كما ان هذه الكائنات تكون شائعة الحدوث كمرضات مساعدة في تلك الأصابات المختلطة التي تتسبب في الوفاة بمعدلات كبيرة تصل الى 20%.

اسست هذه الدراسة لدراسة مرض الالتهاب الرئوي في المرضى السودانيين الذين يكتسبون المرض في المجتمع في ولايه الخرطوم وذلك بالتزريع البكتيري الروتيني وتفاعل البلمره المتسلسل.

وشملت هذه الدراسة 360 مريض سوداني من المشتبه بهم مصابين بالالتهاب الرئوي حضرو إلى مستشفى أمدرمان التعليمي ، مستشفى الشعب التعليمي ، مستشفى بحري التعليمي ومستشفى أبو عنجه. كانت أجناس المرضى 218 (60.6%) ذكور (39.4%) اناث وقسمت اعمار المرضى الى ثلاث مجاميع هي 13-30 ، 31-60 و 61 إلى 91 جميع المرضى من خارج المستشفيات. تم جمع عينات البلغم و تصل إلى المختبر وفقا للشروط القياسية وحسب معايير والمبادئ التوجيهية للجنة العالمية للمختبرات السريرية ( NCCLS ).

تم استخلاص الحامض النووي من عينات البلغم بواسطة مواد كيميائية من شركة جنا العلمية في المانيا , وتم حفظ المصل والحامض النووي في درجة حرارة اقل من 20 درجة مئوية لحين استخدامها. أظهر تزرير العينات الروتيني نتائج موجبة بنسبة (33.8%) 122 وهذه موزعة بنسبة (17.8%) 64 الم كورات العقديه لذات الرئه (10.8%) 39 الكليبيسيلا الرئويه ونسبة بكتيريا المستدميه النزليه (5.3%) 19 و

(66.2%) 238 كانت سالبة . تم اجراء تفاعل البلمرة المتسلسل لجميع العينات مع جين معين واحد لكل بكتريا وأظهرت النتائج (43.6%) 157 موجبة وكانت (22.5%) 81 الم كورات العقديه لذات الرئه و (11.9%) 43 الكليبيسيلا الرئويه و (9.2%) 33 بكتيريا المستدميه النزليه و (56.4%) 203 كانت سالبة للفحص.

كانت نسبة انتشار الألتهاب الرئوي مرتفعة, كانت نسبة الإصابة بالم كورات العقديه لذات الرئه في هذه الدراسة هي الأعلى. كانت نسبة الإصابة بالبكتريا في الذكور (26.9%) 97 اكثر من الأناث (16.6%) 60 ولكن ليس له دلالة احصائية. هناك دلالة احصائية ظهرت في الفئة العمرية 31 to 60 بالنسبه فقط في الكليبيسيلا الرئويه (P= 0.041)

تم فحص اختبار المتواليات لبكتيريا المكورات العنقديه لذات الرئه بعد اجراء تفاعل البلمرة المتسلسل له اوه ي لي  
الهاكف على النتائج, وأظهرت النتائج أن متوسط غطاء الأستعلام يتراوح بين (74% to 100%) وهوية تعريف  
البكتريا بين (92% to 100%).

اظهرت هذه الدراسه بان الاصابه بمرض الالتهاب الرئوي المكتسب من المجتمع نسبيا كبيره, وبان يفضل تحليل  
عينات المرضى بتفاعل البلمره المتسلسل. يفضل باجراء دراسات مستقبلية لعينات البلغم لي انواع اخرى من البكتريا  
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