

الآية

(يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ)

صدق الله العظيم

سورة المجادلة: الآية (11)

DEDICATION

To my parents mercy of God

To my lovely wife and precious Dr. Alia Fouad Baqer

To my lovely daughter Noor Al Zahra

To my deer son Yaseen

To my brothers and sisters and all members of my family

ACKNOWLEDGEMENT

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ABSTRACT

Atypical pneumonia caused by bacterial pathogens, accounts for 40% of all cases of community-acquired pneumonia. Classical microbiological identification techniques cannot provide an efficient means of diagnosis of the causative organisms. Recently, other diagnostic techniques such as serological tests and singleplex Polymerase Chain Reaction (PCR) assays have been developed.

This study was conducted during the period 2013-2016 to investigate community-acquired atypical bacterial pneumonia as well as to determine the prevalence of the disease among Sudanese population.

A total of 400 patients (242 males and 158 females) were enrolled in this study. The patients were grouped according to their age into 13 to 30 years, 31 to 60 years and 61 to 91 years. The mean age of patients was 42.1 years. Sputum and blood specimens were collected from each patient attended four major hospitals in Khartoum State, including Omdurman Teaching Hospital, AL-Shaab Teaching Hospital, Bahry Teaching Hospital and Abu Anja Teaching Hospital. The causative agents were characterized by serological tests using Enzyme Linked Immunosorbent Assay (ELISA) for *M. pneumoniae*, Indirect Immunofluorescence Antigen IIFA (IgM) for *C. pneumoniae* and Indirect Immunofluorescence Antigen IIFA (IgM, IgA and IgG) for *L. pneumophila* then confirmed by molecular technique using singleplex PCR. Sequencing of target gene was carried out in Macrogen (Korea). Similarities and phylogenetic analysis were compared with published data.

The serological tests results revealed that 125 (31.3%) were positive, while the rest 275 (68.7%) were negative. Of the positive 50 (12.5%) were *L. pneumophila*, 43 (10.8%) were *C. pneumoniae* and 32 (8.0%) were *M. pneumoniae*. The PCR technique showed 175(43.9%) were positive and 225(56.1%) were negative. Of the

positive 69 (17.3%) were *C. pneumoniae*, followed by *L. pneumophila* 57(14.3%), and *M. pneumoniae* 49(12.3%). Sequences analysis showed the similarities of identified isolates in gene-bank database were vary from 92% to 100%. Statistical analysis of the results showed that the atypical pneumonia prevalence among patients attended different hospitals was insignificant ($p= >0.05$) as well as gender ($p= >0.05$). The analysis also showed significant prevalence among age group 31-60 years old ($p=< 0.05$). The comparison between serological test and molecular techniques in detection of atypical pneumonia was found significant ($p= 0.000$). The study concluded that the prevalence of atypical pneumonia is high among males than females and it is high in the age group 31 to 60 years old. Although PCR technique was found more accurate than serological techniques, but diagnosis of atypical pneumonia using serological techniques is highly recommended in the absence of PCR facilities.

الخلاصة

الالتهاب الرئوي غير النمطي الناجم عن البكتيرية الممرضة يمثل حوالى 40% من جميع حالات الالتهاب الرئوي المكتسب من المجتمع. التقنيات التقليدية المستخدمة للتعرف على الكائنات الدقيقة المسببة للمرض لا توفر وسيلة فعالة للتشخيص. مؤخراً هناك طرق تشخيص أخرى تم تطويرها مثل الأختبارات المصلية وتقنية تفاعل البلمرة المتسلسل الأحادي.

أجريت هذه الدراسة خلال الفترة 2013-2016 لتشخيص الالتهاب الرئوي الجرثومي غير النمطي المكتسب من المجتمع وكذلك لتحديد مدى انتشار المرض بين السودانيين.

شارك في هذه الدراسة 400 مريض (242 ذكور و 158 اناث). قسم المرضى لفئات عمرية (13-30 سنة، 31-60 سنة و 61-91 سنة) وكان متوسط العمر 42.1 سنة. جمعت عينات البلغم والدم من المرضى الذين راجعوا أربع مستشفيات رئيسية في ولاية الخرطوم، وهي مستشفى أم درمان التعليمي ومستشفى الشعب التعليمي، ومستشفى بحري التعليمي، ومستشفى أبو عنجة التعليمي. شخّصت العينات بالأختبارات المصلية بأنزيم المرتبط المناعي (ELISA) لبكتريا المنفطرة الرئوية، والفحص غير المباشر للغلوبولين المناعي (IgM) لبكتريا المتدثرة الرئوية والفحص غير المباشر للغلوبولينات المناعية (IgM, IgA and IgG) لبكتريا الفيلقية المستروحة. وقد أجري اختبار تسلسل الجين المستهدف في مختبرات ماكروجين (كوريا). وأجريت المقارنة لأوجه الشبه وتحليل النشوء والتطور مع البيانات المنشورة.

أظهرت نتائج الاختبارات المصلية أن 125 (31.3%) كانت ايجابية، في حين أن الباقي 275 (68.7%) سلبية. من الإيجابية 50 (12.5%) كانت الفيلقية المستروحة، و 43 (10.8%) المتدثرة الرئوية و 32 (8.0%) المنفطرة الرئوية. كما أظهرت نتائج تقنية تفاعل البلمرة المتسلسل أن 175 (43.9%) كانت ايجابية و 225 (56.1%) كانت سلبية. من الإيجابية 69 (17.3%) المتدثرة الرئوية، تليها الفيلقية المستروحة 57 (14.3%)، 49 (12.3%) المنفطرة الرئوية. وأظهر تحليل تسلسل أوجه الشبه من العزلات التي تم تحديدها في قاعدة بيانات بنك الجينات وتراوح الأختلاف من 92% إلى 100%. وأظهر التحليل الإحصائي للنتائج أن انتشار الالتهاب الرئوي اللانمطي بين المرضى الذين حضروا الى المستشفيات المختلفة ضئيل ($E \leq 0.05$)، وكذلك بين الجنسين ($E \leq 0.05$). في حين أظهر تحليل النتائج نسبة الإصابة مرتفعة للفئة العمرية 31-60 سنة ($E = > 0.05$). وكانت المقارنة بين الأختبار المصلي والتقنيات الجزيئية في الكشف عن الالتهاب الرئوي اللانمطي كبيرة ($P = 0.000$).

وخلصت الدراسة إلى أن معدل انتشار مرض الالتهاب الرئوي مرتفع في الذكور أكثر من الإناث، وأنه مرتفع في الفئة العمرية 31 إلى 60 سنة. على الرغم من أن الدراسة أظهرت أن تقنية تفاعل البلمرة المتسلسل

أكثر دقة من الأختبارات المصلية، ولكن يوصى بشدة تشخيص الالتهاب الرئوي غير النمطي باستخدام الأختبارات المصلية في حالة عدم توفر التسهيلات لتقنية تفاعل البلمرة المتسلسل.

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