Dedication

I dedicate this research to the person whose

Prayer helps me and encourages me to the way of success

My mother,

To my Father,

My brother and sisters for their support,

My best friends

And

My collegues

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Abstract

Legionnaire's disease affects humans causing mild to severe pneumonia, particularly in immune-compromised individuals**.** The aim of this study was to identify the causative agent and to determine the frequency of *Legionella pneumophila* in potential water samples collected from various environmental sources in Khartoum State, Sudan.

A total of 120 samples were collected from different hospital settings during April to August 2012. Bacteriological examination of collected environmental water samples was performed to isolate *legionella pneumophila* by inoculation on buffered charcoal yeast extract (BCYE) agar. Several biochemical tests including; sodium hippurate, catalase, oxidase tests and gelatin liquefaction were further carried to confirm the identification. Antibiotic and beta-lactamase testing were done to detect resistance or susceptibility.

Out of 120 water samples; 8 (6.7 %) *Legionella pneumophila* isolates were recovered from water environment in air conditions, shower heads and water coolers for the first time in Sudan. The organism was demonstrated as a beta-lactamase producer resistant to ampicillin and penicillin but susceptible to gentamicin, chloramphenicol and erythromycin.

This study concluded that *legionella pneumophila* exists in the environment in Sudan. As an important environment water pathogen, it is vital to initiate further research work with many samples to isolate and identify the organism from different water and food sources to assess prevalence and implications.

الملخص

داء الفيالقة التى يؤثر على البشر وتسبب له التهاب رئوي ويتدرج من خفيف الى حاد، وخاصة عند الأفراد ذوى المناعة الضعيفه. كان الهدف من هذه الدراسة هو تحديد العامل المسبب وتحديد تواتر الفيلقيه المستروحة في عينات المياه التي جمعت من مصادر البيئية المختلفة في ولاية الخرطوم، السودان .

جمعت 120 عينة من المستشفيات المختلفة خلال شهر أبريل إلى أغسطس 2012. تم إجراء الفحص البكتريولوجي وجمعت عينات المياه البيئية لعزل الفيلقيه المستروحة عن طريق تزريع فى اطباق أجار الفحم العازلة من خلاصة الخميرة (BCYE). تم عمل اختبارات الكيموحيويه التى تحتوى على الهيبورات الصوديوم، الكاتلاز، أوكسيديز وإسالة الجيلاتين لتأكيد الهوية. وقد أجريت اختبارات المضادات الحيوية، بيتا لاكتاميز وإلى الكشف عن المقاومة أو القابلية .

من عينات المياه 120؛ 8 (6.7٪) سلالات الفيلقيه المستروحة من البيئة المائية في مكيفات الهواء ، رأس دش ومبردات المياه للمرة الأولى في السودان. وقد ثبت الكائن كمنتج لبيتا لاكتاميز، مقاومة للبنسلين والأمبيسلين وعرضة للجنتاميسين، الكلورامفينيكول والاريثروميسين .

اختتمت هذه الدراسة أن الفيلقيه المستروحة الموجودة في البيئة في السودان. باعتبارها الممرض البيئة المائية الهامة، فمن الأهمية ان يكون فيها المزيد من العمل البحثي مع العديد من العينات لعزل وتحديد كائن من مصادر المياه والمواد الغذائية المختلفة لتقييم مدى انتشار والآثار المترتبة عليها.

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Abbreviations

TMP-SMZ	Trimethoprim/ Sulfamethoxazole
ELISA	Enzyme linked immunosorbent assay
AIDS	Acquired immunodeficiency syndrome
BCYE	Buffered charcoal yeast extract
CFU	Colony-forming unit
DFA	Direct immunofluorescence assay
DNA	Deoxyribonucleic acid
EIA	Enzyme immunoassay
EWGLI	European Working Group for *Legionella* Infections
CR	Complement receptors
FITC	Fluorescein – isothiocyanate - conjugated immunoglobulin
IFAT	Immunofluorescent antibody test
ISO	International Organization for Standardization
LLAP	*Legionella*-like amoebal pathogen
MAb	Monoclonal antibody
Mip	Macrophage infectivity potentiator
PCR	Polymerase chain reaction