

**بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ**

**: قال تعالى**

**اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ (1) خَلَقَ الْإِنْسَانَ مِنْ عَلَقٍ (2) اقْرَأْ  
وَرَبُّكَ الْأَكْرَمُ (3) الَّذِي عَلَّمَ بِالْقَلَمِ (4) عَلَّمَ الْإِنْسَانَ مَا لَمْ يَعْلَمْ )**  
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**صدق الله العظيم**  
**( سورة العلق الايات من ( ١ - ٥ )**

## Dedication

I dedicate this research to my:

Parents,

Teachers,

Colleagues,

Friends and

All students of Sudan University.

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## **Abstract**

Extended-spectrum  $\beta$ -lactamases (ESBLs) have become widespread throughout the world and are now found in a significant percentage of *Escherichia coli* and *Klebsiella pneumoniae* strains in certain countries. This study was conducted in

the Research Laboratory in Sudan University of Science and Technology. The study was carried out during the period from December 2009 to May 2010, to detect TEM, SHV and CTX-M genes in ESBLs-producing *E. coli*.

The *E. coli* strains were obtained from the Research Laboratory. All strains were checked for purity by sub-culturing on nutrient agar and examined microscopically. Bacterial DNA was extracted from each isolate using boiling method. Multiplex PCR was adopted to detect the different genes including (SHV, CTX-M). The result revealed presence of *TEM* gene only in six of the isolates. It is concluded that, TEM gene is the commonest gene in *E. coli* isolates. Thus, this gene may be the dominant one that responsible for ESBL phenomenon among *E. coli* infection in Sudanese patients. Further studies required for confirmation of presence of these genes in clinical Sudanese isolates.

## المستخلص

تعتبر الإنزيمات واسعة الطيف منتشرة في كل العالم وتوجد بنسب وافية في سلالات الإشريكية القولونية و الكلبسيلا الرئوية في دول معينة. هذه الدراسة نُفذت في مختبر البحوث في جامعة السودان للعلوم والتكنولوجيا في الفترة من ديسمبر/ 2009 إلى مايو/ 2010، للكشف عن الجينات ( *TEM* و *SHV* و *CTX-M* ) في الأشرشكية القولونية المنتجة لإنزيمات بيتا لاكتام واسعة الطيف.

تم الحصول على سلالات الإشريكية القولونية من معمل الأبحاث بالجامعة والتأكد من نقاوتها بإعادة تزييعها على الأجار المغذي ومن ثم فحصها مجهرياً. تم استخلاص الحمض النووي منقوص الأكسجين للسلالات باستعمال طريقة الغليان. استخدمت طريقة تفاعل البلمرة المتسلسل المتعدد الإرسال للكشف هذه الجينات. أظهرت النتيجة وجود الجين *TEM* السلالات الست. وخلصت الدراسة إلى أن الجين *TEM* هو الأكثر شيوعاً في سلالات الإشريكية القولونية، لذا يعتبر هذا الجين هو المسئول عن هذه الظاهرة في المرضى السودانيين بعدوى الإشريكية القولونية و ان مزيد من الدراسات مطلوبة للتأكد من وجود هذه الجينات في العزلات الاكلينيكية السودانية.

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### List of Abbreviations

BP	Base pair
CTX-M	Cefotaxime
CLED	Cystine Lactose Electrolytes Difficient
DW	Deionized water
DNA	Deoxynucleic acid
dNTPs	Deoxynucleotide pyrimidines
DDD	Double Disc Diffusion
EAEC	Enteraggregative <i>E. coli</i>
EHEC	Enterohaemorrhagic <i>E. coli</i>
EIEC	Enteroinvassive <i>E. coli</i>
EPEC	Enteropathogenic <i>E. coli</i>
ETEC	Enterotoxigenic <i>E. coli</i>
ELISA	Enzyme Linked Immune Sorbent Assay
EMB	Eosin Methylene Blue
ESBLs	Extended Spectrum Beta Lactamases
GIT	Gastrointestinal Tract
IMViC	Indol Motility Voges proskauer Citrate
KIA	Kligler Iron Agar
M MW	Marker Molecular Wiegth
MgCL <sub>2</sub>	Magnesium Chloride
NA	Nutrient Agar
PCR	Polymerase Chain Reaction
SHV	Sulphydryl variable



TBE	Tris base Boric acid EDTA
TEM	Temoniera
TSI	Tri Sugar Iron
UTI	Urinary Tract Infection
UPEC	Uropathogenic <i>E. Coli</i>
UV	Ultraviolet Light
XLD	Xylose lactose deoxycholate