Cairo University
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Department of Microbiology

Molecular Characterization of Resistance Genes to Extended-Spectrum β-Lactamase in *Klebsiella pneumoniae and Klebsiella oxytoca* Isolates From Meat and Meat Products.

A Thesis submitted by

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For the Degree of

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Abstract

Prevalence of *K. pneumoniae* and *K. oxytoca* in meat and meat products was estimated in the present study. A total of 470 samples of meat and meat products (40 imported frozen minced meat, 35 imported frozen meat, 25 local meat, 24 local minced meat, 34 kofta, 46 sausage, 37 hot dog, 29 canned beef, 106 luncheon, 43 basterma, 51 beef burger) was collected randomly from different retail shops. The prevalence of *K. pneumoniae* was the same in meat and meat products (11.3%)., while the rate of isolation of *K. oxytoca* was higher in meat (9.7%) than in meat products (7.9%), The isolation rate was higher in imported minced meat (15% for *K. pneumoniae* and 10% for *K. oxytoca*) in comparison with the local minced meat (*K. pneumoniae*12.5% and *K. oxytoca* 8.3%). All samples of canned beef were negative. The highest isolation rate among

the meat product samples was from luncheon (16.0% *K. pneumoniae* and11.3% *K. oxytoca*) and basterma (13.9% *K. pneumoniae and* 9.3% *K. oxytoca*) and the lowest was in beef burger **(** 7.8% *K. pneumoniae* and3.9% *K. oxytoca*). Twelve *K. pneumoniae* and *K. oxytoca* isolates were investigated for antimicrobial resistance against β-lactams groups of antibiotics. The resistance of the isolates to cephalothin was 100%, ampicillin 91.7%, cefpodoxime 75%, cefotaxime 66.7%, sulfamethazole 41.7%, ceftazidime 33.3%, ceftriaxone16.7%, imipenem and cefepime 8.3%. The 12 isolates of *Klebsiellae* (5 *K. oxytoca* and 7 *K. pneumoniae*) were tested for *peh* gene (gene of identification of *K. oxytoca*) and β-lactam resistance genes (SHV, TEM, CTX-M).

The SHV gene was detected in 12 (100%) of *K. pneumoniae* and *K. oxytoca* isolates, TEM gene was detected in 11(91.7%) isolates (5 isolates of *K. oxytoca* and 6 isolates of *K. pnemoniae*); while CTX-M gene was detected in 9(75%) isolates (4 isolates of *K. oxytoca* and 6 isolates of *K. pnemoniae*).

DEDICATION

To whom he strives to bless comfort and welfare and never stints what he owns to push me in the success way, who taught me to promote life stairs wisely and patiently, to my dearest late father.

Love you Dad &
I miss you.

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AMP	Ampicillin
Bla	β-lactamase
CAZ	Ceftazidime
CLSI	clinical laboratory standards institute
CPD	Cefpodoxime
CRO	Ceftriaxone
Ctx	Cefotaxime
CTX-M	cefotaxime hydrolyzing capabilities
DDST	Double disc synergy test
E. coli	*Escherichia coli*
ESBL	Extended-spectrum beta-lactamases
FEP	Cefepime
GLY	Glycine (Amino Acid).
IMP	Imipenem
K	*Klebsiella*
KF	Cephalothin
PCDDT	Phenotypic confirmatory disc diffusion test
PCR	Polymerase chain reaction
Ser	serine in biochemistry
SHV	Sulphydryl variable, a type of beta-lactamase
spp.	Species
SXT	Sulfamethoxazole
TEM	Temoneira, a type of beta-lactamase named after the first patient

1. INTRODUCTION

Klebsiella is well known to most clinicians as a cause of community-acquired bacterial pneumonia. *Klebsiella* spp. primarily attack immunocompromised individuals, who are hospitalized and suffer from severe underlying diseases **(Podschun and Ullmann, 1998).**

Klebsiella spp. are opportunistic pathogens that frequently cause nosocomial infections, mainly in neonates and immunocompromised host **(Emori and Gaynes, 1993).**

Nosocomial *Klebsiella* infections are caused mainly by *K. pneumoniae*, the medically most important species of the genus. *K. pneumoniae* causes a necrotizing process with a predilection for debilitated people **(Umeh and Berkowitz, 2002).**

K. pneumoniae infections may occur at almost all body sites, but the highest incidence is found in the urinary and respiratory tract **(regue *et al.*, 2004).**