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# **Genotypic characterization of *Pseudomonas* species isolated from camels**

A Thesis presented by

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### Abstract

One of the important livestock economies are camels which adapt with adverse environmental conditions and provide milk, meat, wool, hides, and skin. Gram-negative *Pseudomonas aeruginosa* is harbor multidrug antimicrobial resistance of camel has serious consequences for human health, SO, this study aimed to characterized of *P. aeruginosa* especially extended spectrum  $\beta$ -lactamases (ESBL) producing ones; phenotypically and genotypically. 30 isolates of *Pseudomonas aeruginosa* with a percent of 12% from total of 250 nasal swabs apparently healthy (150) and diseased camels with respiratory manifestations (100) by cetrimide agar medium. The isolates were confirmed biochemically by GN card of Vitek 2 compact system (bioMérieux). Suspected ESBL *P. aeruginosa* colonies were 56.6% (17/30) by the double disc synergy test (DDST). Antibiotic sensitivity test showed that the *P. aeruginosa* were (100%) resistance to 3<sup>rd</sup> generation cefotaxime and 4<sup>th</sup> generation cefepime, followed by carbapenem: Meropenem and Imipenem (88.2%) and (82.3%), penicillin (82.3%), gentamicin (76.4%), aztreonam (70.5%), erythromycin (29.5%), sulphamethoxazole/trimethoprim (29.5%), and highly sensitive for ofloxacin (100% sensitive) Molecular Detection of virulence genes using *pslA*, *toxA* and *exoU* genes revealed that 29.4%, 23.5% and 17.6% were positive respectively. Detection of ESBLs encoding genes in *P. aeruginosa* recorded that *bla*TEM, *bla*SHV and *bla*CTXM genes were detected in percentages of 64.7%, 47.0% and 29.4%, respectively. Finally, ESBL *P. aeruginosa* showing multidrug antimicrobial resistance that detected by *mexR* gene.

**Keywords** | Antibiotic resistance, Camels, ESBL, *P. aeruginosa*, Virulence genes.

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## LIST OF ABBREVIATION

<b>Abbreviations</b>	<b>Definition</b>
<i>algD</i>	Alginate D
bp	base pair
c	Camelus
CLSI	Clinical and Laboratory Standards Institute
DDST	Double Disc Synergy Test
DNA	Deoxyribonucleic acid
ESBL	Extended-Spectrum beta-lactamase
ESC	Extended-Spectrum Cephalosporin
<i>exoA</i>	Exotoxin A
<i>exoS</i>	Exoenzyme S
<i>exoU</i>	Exoenzyme U
Fig.	Figure
GN Card	Gram-negative fermenting and non-fermenting bacilli card
<i>gyrA</i>	DNA Gyrase A
<i>lasB</i>	Elastase B
<i>lipA</i>	lipase A
<i>lipC</i>	lipase C
<i>LPS</i>	Lipopolysaccharide
MBL	Metallo $\beta$ -lactamase
MDR	Multidrug-resistant
<i>Mex</i>	Multidrug efflux
MIC	Minimum inhibitory concentration
OprL	Outer membrane Lipoprotein L
PCR	Polymerase Chain Reaction
TBE	Tris borate EDTA
TEM	Temoneira
<i>toxA</i>	Exotoxine A
W H O	World Health Organization