





**Cairo University**  
**Faculty of Veterinary Medicine**



**Detection of bacteria and fungi associated  
with canine otitis**

A thesis submitted by:

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**Abstract**

Otitis externa (OE) is the inflammation of external auditory canal, outside the tympanic membrane. The present study aimed to clarify bacteriological and mycological pathogens associated with canine otitis. This study was carried on forty-four dogs suffering from otitis belonged to 8 breeds (Golden Retriever, German shepherd, Cocker spaniel, Siberian husky, Labrador retriever, Rottweiler and Pekinese and Griffon). These dogs of different age groups less than 1 year, 1-5 years

and more than 5 years and of both sexes. On bacterial culture, *Staphylococcus aureus* (*S. aureus*) (44.11%), *Staphylococcus epidermidis* (*S. epidermidis*) (22.05%), *Klebsiella pneumoniae* (*K. pneumoniae*) (16.17%), *Escherichia coli* (*E. coli*) (14.7%), and *Pseudomonas aeruginosa* (*P. aeruginosa*) (2.9%) represented the bacterial isolates. *S. aureus* was the most commonly isolated bacteria. All bacterial isolates were subjected to antimicrobial sensitivity tests by using 20 antibacterial agents. The antibiogram assay showed that all bacterial isolates were sensitive to Piperacillin / tazobactam and imipenem / meropenem. The yeast isolates represented *Malassezia pachydermatis* (*M. pachydermatis*) (9.1%), *Candida albicans* (*C. albicans*) (2.27%) and *Aspergillus niger* (*A. niger*) (6.8%). All yeast isolates were subjected to antifungal susceptibility testing and confirmed by PCR. The antifungal susceptibility showed sensitivity to all discs used except two isolate of *M. pachydermatis* were resistant to fluconazole (FLC) and *C. albicans* was intermediate to itraconazole (IT). Conclusively to control OE, antibiogram should be applied on isolates to guide the veterinarians to choose the most effective therapeutic regimen that reduce the risk of resistance is recommended.

**Key words:** Antibiogram, bacteria, otitis externa, PCR.

## *Dedication*

*I would extend my sincere thanks to my father and my mother, for their care and help. Their constant support behind makes me concentrate on my study and work, and also own enough courage to accept challenges and solve problems.*

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## List of abbreviations

| Abbreviation        | Full name                              |
|---------------------|----------------------------------------|
| <i>A. fumigatus</i> | <i>Aspergillus fumigatus</i>           |
| AK                  | Amikacin                               |
| AMC                 | Amoxicillin Clavulanate                |
| <i>A. niger</i>     | <i>Aspergillus niger</i>               |
| AP                  | Amphotericin B                         |
| API                 | Analytical profile index               |
| AZM                 | Azithromycin                           |
| Bp                  | Base pair                              |
| <i>C. albicans</i>  | <i>Candida albicans</i>                |
| CAZ                 | Ceftazidime                            |
| CC                  | Clotrinazole                           |
| CD                  | Clindamycin                            |
| CI                  | Confidence interval                    |
| CIP                 | Ciprofloxacin                          |
| <i>C. laurentii</i> | <i>Cryptococcus laurentii</i>          |
| CLR                 | Clarithromycin                         |
| CLSI                | Clinical Laboratory Standard Institute |

|                        |                                             |
|------------------------|---------------------------------------------|
| CN                     | Gentamycin                                  |
| <i>C. parapsilosis</i> | <i>Candida parapsilosis</i>                 |
| CRO                    | Ceftriaxone                                 |
| <i>C. tropicalis</i>   | <i>Candida tropicalis</i>                   |
| CTX                    | Cefotaxime                                  |
| DNA                    | Deoxyribonucleic acid                       |
| <i>E. coli</i>         | <i>Escherichia coli</i>                     |
| E test                 | Epsilometer                                 |
| FLC                    | Fluconazole                                 |
| FOX                    | Cefoxitin                                   |
| IT                     | Itraconazole                                |
| ITS                    | Internal transcribed spacer                 |
| <i>K. pneumoniae</i>   | <i>Klebsiella pneumoniae</i>                |
| KT                     | Ketoconazole                                |
| LEV                    | Levofloxacin                                |
| LNZ                    | Linezolid                                   |
| LSN                    | Large subunit                               |
| MALDI                  | Matrix assisted laser desorption/ionization |
| MHA                    | Mueller Hinton agar                         |
| MIC                    | Minimal inhibitory concentration            |

|                         |                                          |
|-------------------------|------------------------------------------|
| <i>M. pachydermatis</i> | <i>Malassezia pachydermatis</i>          |
| MSA                     | Mannitol salt agar                       |
| OE                      | Otitis externa                           |
| OFX                     | Ofloxacin                                |
| OM                      | Otitis media                             |
| <i>P. aeuroginosa</i>   | <i>Pseudomonas aeuroginosa</i>           |
| PBS                     | Phosphate buffered saline                |
| PCR                     | Polymerase chain reaction                |
| <i>P. mirabilis</i>     | <i>Proteus mirabilis</i>                 |
| qPCR                    | Quantitative polymerase chain reaction   |
| rDNA                    | Ribosomal deoxyribonucleic acid          |
| RFLP                    | Restriction fragment length polymorphism |
| RPMI                    | Roswell Park memorial institute          |
| rRNA                    | Ribosomal ribonucleic acid               |
| <i>S. agalactiae</i>    | <i>Streptococcus agalactiae</i>          |
| <i>S. aureus</i>        | <i>Staphylococcus aureus</i>             |
| <i>S. canis</i>         | <i>Streptococcus canis</i>               |
| SDA                     | Sabouraud's dextrose agar                |
| <i>S. epidermidis</i>   | <i>Staphylococcus epidermidis</i>        |
| <i>S. intermedius</i>   | <i>Staphylococcus intermedius</i>        |

|                             |                                         |
|-----------------------------|-----------------------------------------|
| <i>S. pseudointermedius</i> | <i>Staphylococcus pseudointermedius</i> |
| Spp                         | Species                                 |
| SXT                         | Trimethoprim/ Sulfamethoxazole          |
| <i>T. cutaneum</i>          | <i>Trichosporon cutaneum</i>            |
| TZP                         | Piperacillin/ Tazobactam                |
| ml                          | Micro liter                             |
| VA                          | Vancomycin                              |
| VRC                         | Voriconazole                            |
| YPD                         | Yeast extract peptone dextrose          |