

Isolation and Identification of Some Opportunistic Fungi from Camels in Wasit Governorate of Iraq

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The aim of this study was to investigate the percentage of opportunistic fungi and evaluate the diversity of yeasts and moulds associated with pulmonary diseases in camels in Wasit, Iraq. A total of 200 nasal cavity swabs (two swabs for each camel) were taken with sterile cotton swabs from 100 camels of different ages, sexes and areas. The results showed that 60 (60%) samples from 100 camels were positive for the occurrence of moulds and yeasts isolates, which classified into (16) species (37%) of moulds and (9) species (23%) of yeasts. In this study which revealed most frequent moulds isolates were *Asperigellius spp.* specific *A.fumigatus* at percentage 7 (7%) followed by *A.niger* 5 (5%), 3(3%) for each *A.flavus* and *A.terrus* and *Aspergillus spp* 1(1%). On the other hand other molds *Penicillium rubrum* 3(3%), *Penicillium spp.*1(1%) followed by 2(2%) for *Alternaria alternata* ; *Cladosporium*; *Mucor circinelloides*; *Mucor hiemalis* and *Mucor spp.* and 1(1%) for *Rizopus spp*; *Alternaria spp*; *Fusarium solani* and *Fusarium spp.* were identifying. Also through this study shown the total isolation of yeasts were 23(23%) out of 100 camels revealed mainly frequent isolate were *Candida spp.* particular *C.albicans* at percentage 6 (6%) followed by 3(3%) for *C.krusei*; *C. parapsilosis*; *C. tropicalis* and *C. glabrata* 1(1%). Other yeasts also can be identified such as *Cryptococcus neoformans* 2(2%); *Geotricum candidum* 2(2%) and 1(1%) for *Malassezia spp.* This study showed increases of moulds and yeasts isolation in camels with the increase age of animals. In conclusion: showed wide diversity of moulds and yeasts species isolated from camels, the most common molds isolate were *Asperigellius spp.* particular *A.fumigatus* while generally common yeasts isolate were *Candida spp.* specific *C.albicans* and increases of moulds and yeasts isolation in camels with the increase age of animals.

Keyword: Opportunistic Fungi, *A.fumigatus*, *C.albicans*, Camels in Wasit, Nasal cavity swabs, Wasit University, Iraq.

Fungi are eukaryotes organisms and everywhere in the environment, and can cooperate with plants, animals or humans, establish symbiotic, commensal, latent or pathogenic relationships¹. Infection can be considered as an inequity between the host defenses and the infectious agent, with the host incapable to control the propagation of the contagious agent². Fungal diseases will show if the immune system of the host is delicate³. The diagnosing is not easy since clinical beginning is diverse and depends on the host, treatment is

difficult since number of available drugs is limited, and prevention is accessible for some fungi and only for some animal species⁴. Camels compared to other animals have been reported to be less subject to several diseases, thorough information on several aspects of the health status of camels are not well recognized. In spite of this, it has been reported that camels are subjected to various types microbial as well as fungal diseases^{5,6}. Respiratory diseases in camels are consider to be one of the main rising troubles that lead to production loss and death⁷. However, only few studies are available on mycosis in the camels and their etiology in Iraq. Therefore, the aim of this study was to investigated the percentage of opportunistic fungi and evaluate

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the diversity of yeasts and moulds associated with pulmonary diseases in camels in Wasit, Iraq.

MATERIALS AND METHODS

Study Area and Animals

A total of 200 nasal cavity swabs (two swabs for each camel) were taken with sterile cotton swabs from 100 camels of different ages, sexes and areas, during the period of November 2017 to April 2018. These areas include: Al-Mufqiya (40 camels), Al-Sheikh Saad (30 camels), Al-Bashair (20 camels) and villages of Hay city (10 camels) in Wasit province, Iraq.

Sampling and culturing

Two hundred samples of nasal cavity swabs have been collected from 100 camels. by sterile cotton swab, this swab were transferred to the laboratory of veterinary medicine, Wasit University

Table 1. Prevalence of fungal infection in camels

Types of fungi	No. of spp.	No. of isolates	Percentage (%)
Moulds	16	37	37%
Yeasts	8	23	23%
Total	27	60	60%

Table 2. Types of moulds that isolated from nasal cavity swabs of camels

Type of moulds	No. of isolates	Percentage of moulds isolates
<i>Aspergillus fumigatus</i>	7	7%
<i>Aspergillus niger</i>	5	5%
<i>Aspergillus flavus</i>	3	3%
<i>Aspergillus.terrus</i>	3	3%
<i>Aspergillus spp</i>	1	1%
<i>Penicillium rubrum</i>	3	3%
<i>Penicillium spp</i>	1	1%
<i>Alternaria alternata</i>	2	2%
<i>Cladosporium</i>	2	2%
<i>Mucor circinelloides</i>	2	2%
<i>Mucor hiemalis</i>	2	2%
<i>Mucor spp</i>	2	2%
<i>Rizopus spp</i>	1	1%
<i>Alternerria spp</i>	1	1%
<i>Fusarium solani</i>	1	1%
<i>Fusarium spp</i>	1	1%
Total	37	37%

for diagnosis after addition a small amount of sterile distilled water and these swabs directly were inoculated on Sabouraud dextrose agar and Cornmeal Agar plates with chlormphenicol, and incubated duplicated of culture at 30 °C and 37°C for two weeks ⁸.

Molds Identification

Molds isolates were diagnosed according to cultural characteristics on Sabouraud dextrose agar, morphology of hyphae cells, spores and kind of fruiting bodies after staining with lacto phenol cotton blue ⁹.

Yeast Identification

Yeasts isolates were diagnosed depending on cultural description on SDA that include color, shape and size to establish the morphology of the yeast cells. The following tests were used for the identification of the isolated yeast, Germ tube test ¹⁰; Dalmau plate technique on Cornmeal Agar¹¹; and API 20C AUX system (BioMerieux-France) were also performed according to the manufacturer's directions.

RESULTS

The study showed that 60 (60%) samples from 100 camels were positive for the occurrence of moulds and yeasts isolates, which classified into (16) species (37%) of mould and (9) species (23%) of yeast (Table 1). The present study shown that incidence of fungal infection caused by moulds was more than yeasts those showed wide diversity of mould and yeast species. In this study which revealed most frequent molds isolates

Table 3. Types of yeasts that isolated from nasal cavity swabs of camels

Type of yeasts	No. of isolates	Percentage of yeasts isolates
<i>Candida albicans</i>	6	6%
<i>Candida krusei</i>	3	3%
<i>Candida parapsilosis</i>	3	3%
<i>Candida tropicalis</i>	3	3%
<i>Candida glabrata</i>	1	1%
<i>Cryptococcus neoformans</i>	2	2%
<i>Rhodotorula mucilaginosa</i>	2	2%
<i>Geotricum candidum</i>	2	2%
<i>Malassezia spp.</i>	1	1%
Total	23	23%

Table 4. Number of positive fungi isolation relation with age in Camels

Age Fungal isolation	Less than 1 year	1-3 years	3-6 years	6-9 years	10 years	more than 10 years	Total positive
Moulds isolation	1	2	3	6	11	14	37
Yeasts isolation	0	1	1	4	7	10	23
Total positive	1	3	4	10	18	24	60

were *Asperigellius* spp. specific *A.fumigatus* at percentage 7 (7%) followed by *A.niger* 5 (5%), and 3(3%) for each *A.flavus*, *A.terrus* and 1(1%) for *Aspergillus* spp 1(1%). On the other hand other molds *Penicillium rubrum* 3(3%), *Penicillium* spp.1 (1%) followed by 2(2%) for *Alternaria alternata*, *Cladosporium*, *Mucor circinelloides*, *Mucor hiemalis* and *Mucor* spp. respectively and 1(1%) for *Rizopus* spp., *Alternerria* spp., *Fusarium solani* and *Fusarium* spp. respectively also were identifying (Table 2). Also through this study shown the total isolation of yeasts were 23(%23) out of 100 camels revealed most frequent isolate were *Candida* spp. specific *C.albicans* at percentage 6 (6%) followed by 3(3%) for *C.krusei*; *C. parapsilosis*; *C. tropicals* and *C. glabrata* 1(1%). Other yeasts also can be identified such as *Cryptococcus neoformans* 2(2%), *Geotricum candidum* 2(2%) and 1(1%) for *Malassezia* spp. (Table 3). This study showed raise number of moulds and yeasts isolation in camels with the increase age of animals between 6 years to more than 10 years. While less isolation fungi were in age between 6 months to 3 years (Table 4).

DISCUSSION

The present study indicated a large range of fungal from nasal cavity swabs of camels were showed 60 (60%) out of 100 camels as positive for fungi isolation which included 37 (37%) of moulds and 23 (23%) of yeasts. These results corresponded with these mentioned by AL-Bashan and AL-Banki¹² who were able to isolate six different fungal species from nasal cavity swabs of Apparently Healthy Camels such as *Aspergillus flavus*, *Aspergillus nidulans*, *Aspergillus niger*, *Aspergillus fumigatus*, *Penicillium* sp. and *Candida* sp. Results of the current study is also in consistent with Gobrial *et al.*¹³ who identification

of moulds and yeasts fungi from nasal cavity swabs of the Egyptian camels it was found that *Aspergillus* sp.; *Penicillium* sp. and *Candida* sp. as well as other fungi. The current study found that most frequent moulds isolates were *Asperigellius* spp. exacting *A.fumigatus* at percentage 7 (7%) compared with other *Aspergillus* sp. isolated was agreement with the finding of Lacey¹⁴ found that a wide spread fungi around the world is genus *Aspergillus* and mainly pathogenic type causing disease in humans and animals its types; *A. fumigatus* belong to numerous factors; it's aptitude to grow more rapidly than other types in a broad range of temperature (20-50) °C and it is extremely sporelating fungus. Other studies originate that *Aspergillus fumigatus* more common than other moulds when isolated fungi from other animals Ali and Khan¹⁵ they found that the highest fungus related with abortion in cattle and buffaloes was *A. fumigatus* which has been recorded from over 60% of cases, also observations no scientific symptoms have been observed in the dam also before or after abortion.

The present study shown that incidence of fungal infection caused by moulds was more than yeasts. The nasal cavity as a part of respiratory system which contact immediately with outside system location led to simply entry of the spores moulds to the respiratory system by inhalation and accessible environment stander from temperature and humidity create from this system more contact to the fungi infection, it was supposed that housing of animals in relatively restricted spaces predispose them to infection due to the incidence of higher concentration of fungal spores in the air of cowsheds than that of its surrounding^{15,16}. This was in agreement with previous report by Fekadu and Esayas¹⁷ as it was mentioned above, pneumonia was among the mainly significant and frequently encountered disease of the camel. Although low

mortality and morbidity rates, the improvement period was relatively long having negative contact on generally productivity.

In this study, it has been found that the total isolation of yeasts were 23(23%) out of 100 camels revealed most common isolate were *Candida spp.* particular *C.albicans* at percentage 6 (6%) and Other yeasts also can be identified such as *Cryptococcus neoformans* 2(2%); *Geotricum candidum* 2(2%) and 1(1%) for *Malassezia spp.* The current result is in consistent with Osman *et al.*¹⁸ who isolated *Candida albicans* from the nasopharyngeal cavity of apparently healthy camels at Shalateen, Halaieb and Abou-Ramad areas. suffering from different respiratory manifestations. Present results also agree with Al-Maadidhi¹⁹ it was found *C.albicans* more common isolated from ewe of Iraq, this result in line with our result about *C.albicans* which was dominant isolated in nasal cavity swabs of camels. *C. albicans* was the species most commonly causes superficial and invasive infection were ability to adhere to diverse mucosa and epithelia, dimorphism, with assembly of pseudohyphae helping tissue invasion, thermotolerance, and exoenzymes like proteinase and phospholipase and germ tube configuration with subsequent advance of the filamentous form²⁰. The mannan (glycoprotein present on the cell surface of *C.albicans*), adhesion responsible for the attachment of *C.albicans* to host cells more strong than other species of *Candida*²¹.

The current study found that increases fungal isolation in camels with the increase age of animals in age between 6 years to more than 10 years. While less isolation fungi were in age between 6 months to 3 years. Our result was in agreement with the finding of Wiserman *et al.*²² they found that the percentage of fungal isolated increase with age of the animal. The current result also consistent with Al-Maadidhi¹⁹ who studied the fungal infection in reproductive system of ewes, he establish that the percentage of fungal infection increase in the age animal. The causes possibly will due to the animals in this ages enhance facility to environment contact and also the animals are sexually active in this age which may be contamination through coating, parturition and abortion with other microorganism .

CONCLUSION

Showed wide diversity of moulds and yeasts species isolated from nasal cavity of camels, the most common molds isolate were *Asperigellius spp.* particular *A.fumigatus* while most common yeasts isolate were *Candida spp.* particular *C.albicans* and increases of moulds and yeasts isolation in camels with the increase age of animals.

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