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### Prevalence and type of fungi in milk from goats with sub clinical mastitis.

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#### ABSTRACT

Mohammed Hasan KA, Yassein SN., *Prevalence and type of fungi in milk from goats with sub clinical mastitis, Onl J Vet Res., 22 (8):669-674, 2018.* One hundred milk samples from apparently healthy goats were subjected to California mastitis reagent cultured on Sabouraud Dextrose Agar. Some goats had been treated with penicillin. Fifty three (53%) samples were positive to the California mastitis test of which 69% were of mycotic origin. Of these, 16 species of 29 isolates (42.03%) were mould and 12 of 40 isolates were yeast (57.97%). Moulds found were *A. fumigatus* (17.24%), *Penicillium* spp. (13.79%), *A. niger* and *Alternaria* spp. (10.34%), *A. terreus* and *Fusarium* spp. (6.89%), and *A. versicolor*, *Absidia* spp., *Aureobasidium pullulans*, *Cladosporium* spp., *Curvularia* spp., *Moniliella acetoabutens*, *Moniliella suaveolans*, *Mucor* spp. and *Scopulariosis* spp., 3.44%. Yeasts isolated were *C. albicans* (25%), *Geotricum candidum* (15%) and *C. guilliermondii*, *C. parapsilosis*, *C. tropicalis*, *C. kefyer*, *Chrysosporium* spp, *Trichosporon* spp, *Rhodotorula* spp. 7.5% and, *C. famata*, *C. krusei*, and *Saccharomyces cerevisiae* 2.5%. We report a high incidence of diverse fungi in milk from goats with sub-clinical mastitis around Baghdad which could pose a health risk in humans. The findings suggest that antibiotic treatments may affect incidence of fungi in goat milk.

Key words: goat, mastitis, Yeast, mould, Milk

#### INTRODUCTION

Goat milk production is a dynamic and growing industry in the Mediterranean and Middle East (1, 2). Subclinical mastitis (SCM) reduces milk production and is a continuous source of contamination in farms (3, 4, 5). Contamination of milk by pathogenic fungi may pose a risk for consumers when consumed raw or even in the processed form (6). Fungi may affect milk quality and shelf life (7, 8). We report

incidence and type of fungi isolated from milk of does with SCM in Baghdad, Iraq. Mastitis can result from yeast infection, which appears to be associated with the frequent use of penicillin, with prolonged and repetitive intra-mammary infusions (9) We describe fungi from milk of does with SCM but apparently healthy, around Baghdad, Iraq.

#### MATERIALS AND METHODS

One hundred milk samples were collected manually aseptically from 50 right and left udders of lactating does, age ~3 years from February to May 2018 tested for mastitis by the California mastitis test as described by Coles, EH (1986) (10). Milk was cultured on sabauroud dextrose agar plates incubated at 28±2 °C for 3-7 days. Fungal isolates were identified as described by Washington et al., (2006) by the lacto-phenol-cotton-blue stain (11) which identifies mould by culture characteristics, morphology of hyphae cells, spores and fruiting bodies, and yeasts by sugar fermentation and assimilation tests.

#### RESULTS

Fifty three milk samples were positive to the California mastitis test. Of these 69% were mycotic wherein 29 isolates of 16 species were moulds 42.03% and 40 isolates of 12 species (57.97%), were yeast (Table 1).

Table 1: Fungi isolated from milk of Does positive to the California mastitis test

Fungi	Species	Isolates	Total isolates	Percent (%)
Yeasts	12	40	69/100 (69%)	57.97%
Moulds	16	29		42.03%

Table 2 lists type of yeast isolated from goat milk. We found 24 of 40 isolates to be *Candida spp* including *C. albicans* (25%) *C. guilliermondii*, *C. parapsilosis*, *C. tropicalis* and *C. kefyer* 7.5%, and *C. famata*, *C. krusei*, and *Saccharomyces cerevisiae* were 2.5%. There were 6 isolates of *Geotricum candidum* (15%) and *Chrysosporium spp*, *Trichosporon spp* and *Rhodotorula spp* 7.5% each.

Table 2: Yeast isolated from milk of goats with subclinical mastitis.

Type of yeasts	No. of isolates in subclinical mastitis	Percent (%)
<i>Candida albicans</i>	10	25%
<i>C. guilliermondii</i>	3	7.5%
<i>C. paraosilosis</i>	3	7.5%
<i>C. tropicalis</i>	3	7.5%
<i>C. kefyer</i>	3	7.5%
<i>C. famata</i>	1	5%
<i>C. krusei</i>	1	5%
<i>Chrysosporium spp</i>	3	7.5%
<i>Geotricum candidum</i>	6	15%
<i>Trichosporon spp</i>	3	7.5%
<i>Rhodotorula spp</i>	3	7.5%
<i>Saccharomyces cerevisiae</i>	1	2.5%

Moulds isolated are listed in Table 3 below. We found 29 moulds with several *Aspergillus* of which 11 (41.35%) were *Aspergillus* spp. *A. fumigates* 5 (17.24%); *A. niger* 3 (10.34%); *A. terreus* 2 (6.89%) and *A. versicolor* 1 (3.44%). There were 4 isolates of *Penicillium* spp (13.79%) and *P. funiculosum*, *Absidia* spp, *Aureobasidium pullulans*, *Cladosporium* spp, *Curvularia* spp, *Moniliella acetoabutens*, *Mucor* spp and *Scopulariosis* spp at ~3.44% each.

Table 3: Types of Moulds that isolated from subclinical mastitis.

Moulds	Isolates	Percent (%)
<i>Aspergillus fumigates</i>	5	17.24%
<i>Penicillium</i> spp.	4	13.79%
<i>A.niger</i>	3	10.34%
<i>Alternaria</i> spp.	3	10.34%
<i>A.terreus</i>	2	6.89%
<i>Fusarium</i> spp	2	6.89%
<i>A.versicolor</i>	1	3.44%
<i>Absidia</i> spp.	1	3.44%
<i>Aureobasidium pullulans</i>	1	3.44%
<i>Cladosporium</i> spp	1	3.44%
<i>Curvularia</i> spp	1	3.44%
<i>Moniliella acetoabutens</i>	1	3.44%
<i>Moniliella suaveolans</i>	1	3.44%
<i>Mucor</i> spp.	1	3.44%
<i>P. funiculosum</i>	1	3.44%
<i>Scopulariosis</i> spp.	1	3.44%

## DISCUSSION

There are few reports dealing with mycotic infection in goats in Iraq (12). However, Yassein *et al.*, (13) found *C. neoformans* in goats by conventional and multiplex PCR methods. Al-Kubaysi (14) reported *C. albicans* in subclinical mastitis of ewes in 4 of 19 isolates and Sahan (15) in 32.3% in yeasts isolated from bovine mastitis. Aziz MM. (16) reported 25% *Candida* spp being 22.48% of all isolates in cattle. In our study, possibly, the high incidence for *Candida* spp isolates was induced by repeated treatments with antibacterials such as penicillin (17). Antibiotics can inhibit normal microflora enhancing opportunistic *Candida* spp (18). Antibiotics can be contaminated by fungi (19). Compromised immunity can facilitate fungal infection as reported by Seyedmousavi *et al.*, (20).

Spanamberg A *et al.*, (21) found yeasts in 59% raw milk or 2 cheese samples from goats including *Bullera*, *Candida*, *Cryptococcus*, *Debariomyces*, *pichia*, *Rhodotorula*, *Sporodiobolus*, *Trichosporon* and *Zygoascus*. In contrats, Rezki *et al*; (22) found the most common yeast isolated from milk samples and its products of camel, goat, sheep and cow was *Yarrowia lipolytica*.

We found 3 isolates of *Chrysosporium* spp representing 7.5% of total fungi. This species is saprophytic fungus which has been associated with foot rot in cattle (23). It is air borne around dairy barns and can contaminate milk (23). To our knowledge this is a first report of *Chrysosporium* spp from goats with SCM. We also found 6 isolates

of *Geotricum candidum* representing 15% fungi. This fungus is widely distributed in nature and injury to teat sphincters can cause infection (24). Our results simulate previous work of Hassan, A.A, et al 2012 and Hassan B.H. et al 2014 who reported prevalence of 4% *Geotricum candidum* in milk samples of healthy goats and 0% in sheep. These authors isolated this species from soil of infected animals considered the source of infection to other animals. It could be that the long teats and large udder in Does make them susceptible to infection by *Geotricum candidum* (24,25).

We found 7.5% *Trichosporon* spp and *Rhodotorula* spp in goats with SCM, simulating previous work (25). In Turkey, Tukyilmaz and Kaynarca (26) referred to 2 isolates of these yeasts (4.9%). *Saccharomyces cerevisiae* represented 2.5% in the present study of subclinical mastitis in goat which corresponded with other findings showing this yeast could cause mastitis in cows (27).

Mastitis caused by moulds is rare, but bad management, antibiotics, stress and other factors suppress udder immunity allowing fungal spores in mammary gland (28). Our findings simulate Bourabah A., (2013) with *Aspergillus* who reported 24.7% in goats in Algeria. AL-Kubaysi (29) found *Aspergillus* spp *A. fumigates* 11 (7.43% in both clinical and subclinical ovine mastitis); while *A. niger* 1 (0.67%) ; *A. terreus* 1 (0.67%) and *A. parasiticus* 1 (0.67%) in subclinical form. In contrast, Sahan (15) reported *A. niger* 2.9% in clinical bovine mastitis.

*Alternaria* spp causes mastitis in cows with 1 isolate (2.9%) from cases of subclinical bovine mastitis (15). The higher incidence we found in goats, may be due to *alternaria* in soil or poor milking hygiene. We isolated *Absidia*, *Aureobasidium pullulans*, *Cladosporium* spp, *Curvularia* spp, *Moniliella acetoabutens* and *Moniliella suaveolans* not reported previously in mastitis in Iraq. Another significant finding of our study was the high incidence of *Penicillium* spp (13.79%) compared with Sahan H.F. (15) who reported 2.9% in bovine mastitis. We found 2 isolates of *Fusarium* spp, and 1 of *Mucor* and *Scopulariosis* spp as reported previously (24, 30). These differences among mould isolates might be due to the different isolation techniques or different status of immune defensive mechanisms of animals, we find a relatively high incidence of fungi in SCM in goats which may or not be due to antibiotics.

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