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Clinicopathological and bacteriological studies on some bacterial infections in milk of she- camel

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Abstract
In the present study 100 milk samples were aseptically collected from lactating camels suffering from clinical mastitis As well as, 50 quarter milk samples were obtained randomly from apparently healthy contact adult she camel .California Mastitis Test (CMT), Laboratory studies including Somatic Cell Count (SCC), bacteriological examination and biochemical analysis of milk were conducted. CMT scores of negative and trace were considered healthy and 1,2 and 3 were considered mastitic cases.
The result of bacteriological examination revealed that *staphylococcus. aureus* was the main causative agent in both of clinically and subclinically mastitic cases (27%) in camels, followed by *Escherichia coli* (22.5%), coagulas e*negative Staph* (18%), *Streptococcus disagalactia* (13.5%), *Corny bovis* (9%), *Streptococcus agalactia* (5.4%) and *Klebsiella* spp. (4.5%). In vitro senstivity test was conducted on all isolates against many antibiotic to choose the drug of choice for treatment. SCC of subclinical and clinical mastitis milk samples revealed increase when compared with apparently healthy samples, biochemical changes in milk whey showed significant increase in the levels of chlorine, sodium, urea, total protein, albumin, lactoferrin, immunoglobulin and lactate dehydrogenase in both subclinical and clinical mastitic milk samples while potassium and α lactoalbumin showed decrease.

Key words: *Camel, mastitis, bacterial cause, SCC, CMT, biochemistry of milk*

Introduction

Camel milk is one of the important sources of food for many people. It can be used for making various dairy products **Alhadrami *et al*., (2003)**. Camel milk contains the necessary proteins, sugars, fats, minerals and vitamins especially vitamin C for the young calves and available food for the people. On the other hand, udder infection was considered as one of the main constrains for camel rearing **(Al Ani and Al shareefi, 1997).**
Mastitis is inflammation of mammary gland , it is chracterized by physical , chemical changes in milk and pathological changes in glandular tissues. Mastitis has been estimated to affect more than 25% of lactating she-camel **Alamin, *et al*., (2013)**. Mastitis is also known to cause approximately 70% losses in milk production **Fazlani *et al*., (2011) .**
Mastitis appears in two forms: clinical mastitis, where symptoms are visible and easy to diagnose, and subclinical mastitis where symptoms are invisible and require indirect means for diagnosis. Reports indicated that subclinical mastitis affects animal health, reduces milk quantity and quality, impairs preservation and processing and is a public health concern for camel milk consumers **Matofari *et al*., (2003).**
The early detection and treatment of subclinical mastitis greatly reduces the incidence of clinical mastitis. For monitoring mastitis, a number of tests to detect changes in milk can

be routinely used for screening purposes in milking herds. One of the screening procedures, for both clinical and subclinical mastitis, involves the measurement of somatic cell counts (SCC) in milk. SCC is a count of the number of neutrophils and normal udder cells present in milk. An increase in the SCC to more than $5x10^5$ cells/ml is considered to be an indication of udder infection in cattle **Obeid *et al.*, (1996)** and camel **Eberlein (2007).**

Many studies were conducted on the relationship between California mastitis test (CMT) and bacterial count. They concluded that a high percentage of mastitic cases were positive in CMT and there was a significant difference between the number of bacteria in CMT positive and negative cases. Values of CMT, somatic cell counts (SCC) and bacterial isolates were compared **Barbour *et al.*, (1985).**

The abuse use of antibiotics; for treatment of mastitis without in vitro testing of the sensitivity of the causative agents to antibiotics; leads to failure of mastitis treatment, arising of new bacterial generations with multiple drug resistance and it also has a public health hazard **Saxena *et al.*, (1993).**

Lactoferrin is iornbinding glycoprotien, is present in milk and synthesized by specific granules of polymorphnuclear leukocytes **Lonnerdal and lyer (1995)** and by glandular epithelial cells of mammary gland **(Baynes and Bezwoda, 1994).** Lactoferrin playes a key in defense mechanisms of the mammary gland, contributing the prevention of microbiological infection diseases **Lee *et al.*, (2004)**. Lactoferrin also may limit the oxidative degeneration of cellular components that can occur during periods of tissue disruption.

The aim of this work is to identify the major etiological agents of camel mastitis, determine both of the drug of choice for treatment and chemical changes in camel milk constituent as montoring factores for early detection of mastitis.

Materials and Methods

1. Milk sample collection:

A total of 100 milk samples were aseptically collected from lactating camels with clinical mastitis, as diagnosed clinically and using CMT and SCC. Milk samples were collected from individual quarters during morning milking time. Before milking, all quarters were carefully examined by visual observation and palpation. The teat ends were thoroughly washed with water and dried with clean towel. The first three to four squirts of milk from each quarter were discard, the second one drawn onto a strip cup and examined for the presence of clots, flakes, blood or pus and change in the colour of milk. Approximately two to three ml of milk from each quarter was drawn onto paddle cups for the CMT test. Then ten ml of milk was collected from each teat directly into clean and sterile plastic tubes and transported to the laboratory in an icebox for bacteriological and biochemical examination. As well as, 50 quarter milk samples were obtained randomly from apparently healthy contact adult she camel for microbiological investigation and testing by CMT, SCC for the detection of subclinical mastitis.

2. California Mastitis Test (CMT):

The test was carried out according to manufacturer's recommendation (Bori-Vet, Denmark). The test scores were as follows: negative: no thickening homogenous; trace: slight thickening that disappears in 10 seconds; 1: distinct thickening, no gel; 2: thickens immediately and begins to gel; 3: clear gel formation with surface elevation.

3. Somatic cell count (SCC):

The somatic cell counts (cells/ml) for the quarter milk samples were determined using NucleoCounter SCC-100 (Neucleocounter SCC electronic, Chemometec A/s Denmark) according to **(Fransravn, 2005).**

4. Bacteriological examination:

The milk samples were thawed at room temperature and a bacteriological loop full of milk was streaked on 5% blood agar and MacConkey agar **(Barrow *et al.*, 1993)**. The cultured plates were incubated aerobically at 37°C for 18-24 hours. Pure cultures were obtained by sub-culturing part of typical and well isolated colony on a corresponding medium. This

method was repeated at least twice. The resulting growth was checked for purity by staining smear samples with Gram's stain. The pure isolates of bacteria were identified by using standard biochemical tests **(Cowan and Steel, 1985).**

5. Sensitivity test:

5.1. **Antimicrobial agents and media:**

The sensitivity of the organisms to different antimicrobial agents was done using Oxoid-discs including 10 mcg ampicillin (AM), 30 mcg cefotaxime (CTX), 2 mcg lincomycin (LN), 30 mcg tetracycline (TE), 25 mcg co-trimoxazole (SXT), 5 mcg ciprof-loxacin (CIP), 10 mcg gentamycin (GN), 30 mcg cephalexine (CFX), 5 mcg cloxacillin (CLX) and 5 mcg ofloxacin (OFF). The media used was Muller Hinton medium.

5.2. **Test procedure:**

The method used was the standard disc diffusion method according to **NCCLS (2002)** and the **WHO (1977)** standards Table (1). The percentage of sensitivity was calculated as described by **Bauer *et al.*, (1966) and Fazlani *et al.*, (2011).**

Table (1). Standard inhibition zone diameter interpretive chart (WHO, 1977).

Antibiotic	Disk contents	Zone of inhibition (mm)		
		Res ≤	Inter.	Sens.≥
AM	**10 mcg**	22	23-30	31
CFX	**30 mcg**	14	15-17	18
CIP	**5 mcg**	15	16-20	21
CTX	**30 mcg**	14	15-22	23
SXT	**25 mcg**	11	12-16	17
GN	**10 mcg**	12	13-14	15
LN	**2 mcg**	9	10-14	15
OFF	**5 mcg**	15	16-20	21
CLX	**5 mcg**	9	10-13	14
TE	**30 mcg**	14	15-18	19

Res. = resistant; Inter. = intermediate resistance; Sens. = sensitive.

Preparation of whey milk:

Milk sample was prepared as serum milk (whey) according to technique of **Kumar and Mikolajcik (1972).** The clear whey was separated and used for determination of total whey protein according to **Sonnenwrith and Jarette (1980)**, determination of chloride according to **Feldkamp (1974)**, Sodium and potassium were measured using flamphotometer Corning modle, 410, USA**,** urea according to **Patton and Crouch (1977)**, determination of lactate dehydrogenase according to **Buhl and Jakson (1987)** and determination of lactoferrine concentration and other protein fractions were detected by SDS- polyacrilamide gel electrophoresis (SDS-PAGE) performed according to **laemmli (1970)** and calculated according Syngene*. No 17292*14518 Sme *mpcs*

Statistical analysis:

The obtained data were Statistically analysed by using student 't' test according to **Sendecore (1993).**

Results

Udder of mastitic animals showed cardinal signs of inflammation including (swelling), hardness, induration, redness and pain. In addition to physical changes of milk including changes in colour, consistency, taste and volume. While apparently healthy cases showed

no visual changes.

Dealing with California Mastitis Test, the result revealed that the total number of examined she camel milk samples were 150 samples the number of negative (slight precepetation), number of one **(**Distenctive precepetation), two (Thickness with gel formation), and three (viscosity increase with strong gel formation) positive (CMT) were 30 (19.99%), 42 (27.99%) and 49 (31.99) respectively this illustrated in Table (2). Table (3) showed the correlation between Somatic cell count and CMT.

Table (2). California mastitis test (CMT) scores:

State of udder	Total No. of examined samples	CMT									
		-ve		Trace(T)		+1		+2		+3	
		No	%	No	%	No	%	No	%	No	%
Clinically mastitic she-camels	150	-		-		20	13.33	37	24.66	43	28.66
Apparently healthy she-camels		20	13.33	10	6.66	10	6.66	5	3.33	5	3.33

Note: Negative and trace score are considered negative while +1,+2 and +3 are considered positive.

Table (3). Correlation between Somatic cell count (SCC) and California mastitis test (CMT):

Healthy state of udder	Number of examined samples	Range of somatic cell count	California mastitis test results				
			-ve	T	+ve	++ve	+++ve
Clinical mastitic	100	$>10^6$	--	--	20	37	43
Apparently healthy	50	$4x10^4$-$5x10^5$	20	10	10	5	5

-ve (negative**), T (**trace**), +ve, ++ve, +++ve** (positive)

Bacteriological findings:

Table (4) showed the main pathogenic organisms isolated from camel were of *Staphylococcus aureus* (27%), followed by *Escherichia coli* (22.5%), coagulase negative *Staph* (18%), *Streptococcus disagalactia* (13.5%), *Corny bovis* (9%), *Streptococcus agalactia* (5.4%) and *Klebsiella* spp (4.5%).

Table (4). Bacterial species isolated from milk samples obtained from clinically mastitic and apparently healthy she-camel:

Bacterial species	Total No. of isolates	Apparently healthy case		Clinically mastitic cases	
		No. of isolates	% of total isolates	No. of isolates	% of total isolates
Staphylococcus aureus	40	10	15.4%	30	37%
Coagulase negative staph	33	13	20%	20	18%
Strept. Agalactia	12	6	9.2%	6	5.4%
Strept. dysagalactia	22	7	10.8%	15	13.5%
E. coli	40	25	22.5	15	23.1%
Corynebacteriumbovis	21	10	9%	11	16.9%
***Klebsiella*species**	8	3	4.6%	5	4.5%
Total	176	74		102	

Table (5) showed the antimicrobial susceptibility test of different isolate *Staph aureus* isolates were sensitive to Tetracyclin, Cefotaxime, Gentamycin and Lincomycin and less sensitive to Ampicillin, Ciprofloxacilin and Cloxacillin but resistant to Ofloxacin. Coagulase negative *Staph*. was sensitive to Cefotaxime- and Gentamycin while *streptagalactia* was highly sensitive to Cefotaxime, Ciprofloxacin and Gentamycin and sensitive to Tetracycline and Lincomycin. While it was resistant to Ampicillin, Ofloxacin and Cloxacillin. While *Streptdisagalactia* isolated from camel milk was sensitive to Cefotaxime, Cephalexine, Ciprofloxacin, Gentamycin and Tetracyclin and was resistant to Ampicillin and Ofloxacin. The *E. coli* was moderately sensitive to Ampicillin, Cephaloxin, OFloxacin and Ciprofloxacin, but it was too sensitive to Cefotaxime, Co-trimoxazole, Tetracyclin, Gentamycin and Lincomycin. Also, The Corynebovis was sensitive to Gentamycin and Lincomycin and resistant to Ampicillin, Cefotaxime, Ofloxacin and Cloxacillin. Concerning to *Klebsiella* spp. was sensitive to Ampicillin, Cephaloxin and moderately sensitive to Ofloxacin and Ciprofloxacin.

Table (5). Sensetivity percentage of bacteria isolated from milk of both mastitic and apparently healthy she-camels:

Bacterial species	No. of isolates	Antibiotics tested																			
		AM		CFX		CIP		CTX		SXT		GN		LN		OFF		CLX		TE	
		No*	%	No*	%	No*	%	No*	%	No*	%	No*	%	No*	%	No*	%	No*	%	No*	%
Staphylococcus aureus	40	28	70	12	30	28	70	32	80	8	20	32	80	32	80	0	0	4	10	36	90
Coagulase negative staph	33	16.5	50	9.9	30	16.5	50	29.7	90	3.3	10	29.7	90	6.6	20	9.9	30	6.6	20	16.5	50
Strept. agalactia	12	0	0	12	100	12	100	12	100	1.2	10	12	100	10.8	90	0	0	0	0	11.4	95
Strept. dysagalactia	22	0	0	20.9	95	20.9	95	22	100	4.4	20	19.8	90	17.6	80	0	0	2.2	10	19.8	90
E.coli	40	36	90	36	90	32	80	20	50	20	50	8	20	8	20	36	90	36	90	20	50
Corynebacteriumbovis	21	0	0	0	0	18.9	90	10.5	50	10.5	50	19.95	95	19.95	95	0	0	0	0	18.9	90
Klebsiella species	8	7.6	95	0	0	5.6	70	4	50	4	50	2	25	2	25	6.8	85	6.8	85	4	50

*number of sensitive isolate

Clinicopathological results:

In the present study table (6) showed somatic cell count of milk which recorded significant increase in subclinical and clinical mastitic camel milk samples which ranged from $5.65x10^5$ to $1.56 x10^6$ cells/ml.

Table (6). Somatic cell count (SCC) in milk of camel suffered from subclinical and clinical mastitis:

Parameter	Healthy (control)	Subclinical mastitic	Clinical mastitic
SCC cell/ml	$46.4x10^4 \pm 0.377 x10^4$	$56.5x10^4 \pm 4.5 x10^4$*	$156x10^4 \pm 15 x10^4$*

*Significant at P <0.05

Table (7) illustrated the biochemical changes in milk serum, chlorine, sodium and urea levels showed significant increase in both subclinical and clinical mastitic milk samples, while potassium showed decrease, normally the potassium is the predominant mineral in milk.
Concerning to whey lactate dehydrogenase activity (LDH) showed significant increase in both subclinical and clinical mastitic samples.

Table (7). Biochemicals values of camel whey milk in subclinical and clinical mastitis:

Parameter	Healthy (control)	Subclinical masitis	Clinical mastitis
LDH U/L	27.2 ± 0.65	34.4±1.50*	44.2±2.15*
Chloride mg/dl	87.2 ± 1.04	117±0.74*	127.8±0.57*
Sodium mmol/L	29.7 ± 0.53	35.8±0.81*	40.9±1.5*
Potassium mmol/L	50.74 ± 1.51	44.84±0.85*	40.81±1.1*
Urea mg/dl	15.8 ± 0.65	23.8 ± 1.44*	35.2 ± 0.84*

*Significant at P <0.05

Total whey protein showed increase in both clinical and subclinical cases of mastitis, while the protein fraction revealed increase immunoglobulin, lactoferrin, serum albumin and decrease in α lactoalbumin percent of total protein Table (8) and fig. (1).

Table (8). Values of total protein and its fraction (% of total protein) of camel milk in subclinical and clinical mastitis:

Parameter	Healthy (control)	Subclinical masitis	Clinical mastitis
Protein g/dl	0.87 ± 0.04	1.38 ± 0.08*	2.83 ± 0.09*
Immunoglobulin %	10.71 ± 0.51	13.63 ± 0.6*	15.9 ± 1.2*
Lactoferrin%	4.14 ± 0.45	10.63 ± 1.2*	17.7 ± 1.6*
Serum albumin %	5.57 ± 0.69	12.41 ± 1.4*	15.41 ± 1.3*
α lactoalbumin	14.16 ± 1.5	9.58 ± 1.2*	7.20 ± 1*

*Signficant at P <0.05 using student (t) test comparing with control.

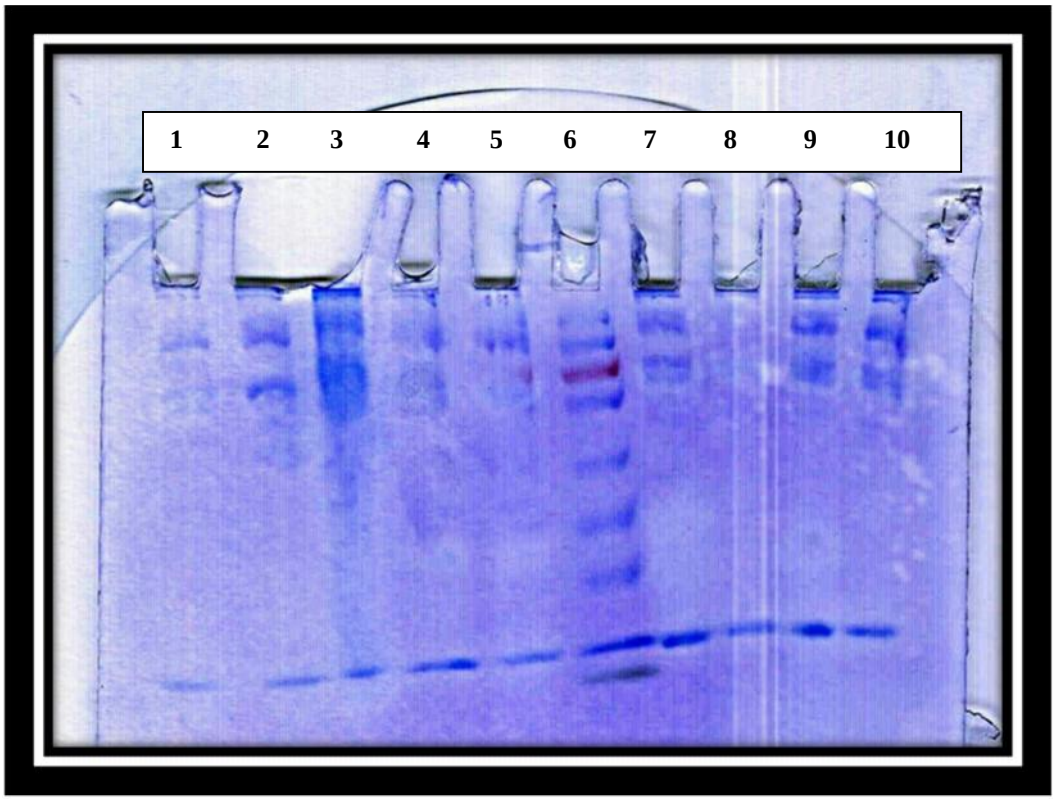

Fig (1): SDS-PAGE protien profile of camel milk whey samples (lane 1&2healthy)(lane3 -5 subclinical cases and lane 7-10 clinical cases). lane 6: Page Regular TM prestained protien ladder, Fermentas MW,KDs(10, 17, 26, 34, 43, 55, 72, 95, 130, 170).

Discussion

In the present study, cardinal signs of inflammation including oedema hardness, hotness, induration and severe pain were obvious in clinical mastitic cases in addition to abnormal milk secretion including (physical changes as abnormal colour, consistency and taste), this was mentioned also by **Al-Tofaily and Al-Rodhan (2011).**

CMT and SCC tests were used in this study for diagnosis of clinical and subclinical mastitis in camels.CMT scores of negative and trace were considered healthy while 1,2 and 3 were considered mastitic cases. This was agree with the study applied by **Aljumaah *et al.*, (2011)**. The average SCC in healthy milk was determined to be 450000 cells/ml and counts up to 505000 cells/ml which correspond to CMT score 1, were considered to be subclinical cases, **Nagi *et al.*, (2013)** reported similar results as they declared the correlation between Log SCC and CMT.

Bacteriological examination of milk samples that *Staph. aureus* was the main causative agent in both of clinically and subclinically mastitic cases (27%) in camels, followed by *E. coli* (22.5%), *coagulase negative Staph* (18%) , *Streptdisagalactia* (13.5%), *Cornybovis* (9%), *Streptagalactia* (5.4%) and *Klebsiella* spp (4.5%). These findings, in general, agree with **AL Ani and AL SHAreefi (1997).**

However, **Eyassu and Bekele (2010)** found that the predominant etiological agent of camel mastitis was coagulase negative Staph.

Also **Hawari and Hawasi (2008)** concluded that the most predominant bacterial agents were micrococcus species, *Staph aureus, Strept* spp and *coryne* spp. respectively.

Staph aureus isolates were sensitive to Tetracyclin, Cefotaxime, Gentamycin and Lincomycin and less sensitive to Ampicillin, Ciprofloxacilin and Cloxacillin but resistant to Ofloxacin. These findings disagree with the findings of **Alqurashi *et al.*, (2013)** who reported that

Staph aureus was resistant to floxacilin and sensitive to ciprofloxacin, ofloxacin and Gentamycin **(suheir, 2004)** showed that the sensitivity of *Staph aureus* to Ampicillin and tetracycline is low.

The discrepancies between these results are probably due to the resistance developed by organisms due to the abuse of these antibiotics.

Coagulase negative *Staph*. was sensitive to Cefotaxime and Gentamycin. While *streptagalactia* was highly sensitive to Cefotaxime, Ciprofloxacin and Gentamycin and sensitive to Tetracycline and Lincomycin. While it was resistant to Ampicillin, Ofloxacin and Cloxacillin.

In this study *Streptdisagalactia* isolated from camel milk was sensitive to Cefotaxime, Cephalexine, Ciprofloxacin, Gentamycin and Tetracyclin, and was resistant to Ampicillin and Ofloxacin these results agreed with the study of **Alqurashi *et al.*, (2013)** who reported that *Streptdisagalactia* was highly resistance to Ampicillin.

However, **Hawari and Hassawi (2008)** reported that *strept* spp. was highly sensitive to Ampicillin.

The *E. coli* was moderately sensitive to Ampicillin, Cephaloxin, OFloxacin and Ciprofloxacin, while it was too sensitive to Cefotaxime, Co-trimoxazole, Tetracyclin, Gentamycin and Lincomycin.

The Corynebovis was sensitive to Gentamycin and Lincomycin and resistant to Ampicillin, Cefotaxime, Ofloxacin and Cloxacillin. These results disagree with **(Alqurashi *et al.*, 2013)** who found that *Corynebacterium* was highly sensitive to Gentamycin but agree with **(Fazlani *et al.*, 2011).**

Klebsiella spp. was sensitive to Ampicillin, Cephaloxin and moderately sensitive to Ofloxacin and Ciprofloxacin.

It was recommended the use of these antibiotics in combination to avoid the microbial resistance and strict hygienic measures during production and handling of camel milk to reduce public health hazards in addition to increase the awareness of camel owners about the importance of hygienic milking practice to minimize the adverse effect of mastitis on the yield and quality of camel milk.

During mastitis the permeability of the blood milk barrier increases, allowing the somatic cells to pass from blood to milk. This increased permeability also results in other components moving from blood to milk and vice versa. The epithelial cells can be destroyed due to bacteria toxins and hence the secretion capacity is impaired **Sandholm (1995).**

SCC is the predominant marker for mastitis used worldwide. The level of SCC indicating mastitis has been debated, with varying results.

The somatic cell count (SCC) is used to classify udder health status and detection of mastitis in camels as positive or negative for mastitis (**Bekele and Molla 2001 and Younan *et al.*, 2001).** Somatic cell count of camel milk has not been studied extensively; conesquently an accepted "normal" value has not been established **Fthenakis *et al.*, (1991).**

The references on SCC in camel milk were recent and not common. According to **Merin *et al.*, (2004)**, the SCC values in infected udder are lower in camel when compared to the other ruminants who recorded SCC 100,000, 118,000, 374,000 and 485,000 in non infected milk samples of camel, cow, ewe and goat respectively, while in infected milk samples the somatic cell count recorded 308,000, > 1,000,000, 2, 203,000 and 3,272,000 in camel, cow, ewe and goat respectively.

In the present study showed increase in somatic cell count in clinical and subclinical mastitis, this results coordinate with results obtained by **Woubit *et al.*, (2001)** recorded SCC in ranged from 3 $x10^5$ to 1.5 x 10^7cells/ ml of infected camel milk, **(Abdel Gadir *et al.*, 2006)** recorded increase in SCC in camel milk samples positive to bacterial isolation and **Saleh and Fady (2011)** reported SCC varied from 9000 to 2,000,000 cells/ml. **Guliye *et al.*, (2002)** recorded the SCC increased from $1.01x10^5$ to $11.78x10^6$ cells/ ml with Quarter milk samples that contained bacteria.

Concerning to biochemical changes in mastitic milk showed increase in chlorides, urea, sodium levels and decrease in potassium. The previous parameter is more high in samples

suffered from clinical mastitis. This result confirmed by other authors as methods of monitoring udder health **(Vijayalakshmi *et al.*, 2001; Bruckmaier *et al.*, 2004).** Intramammary infection results damage to the ductal and secretory epithelium, an opening of the "tight junctions" between secretory cells, and the increased permeability of the blood capillaries. Thus sodium and chloride (which are high in extracellular fluid) pour into the lumen of the alveolus and in order to maintain osmolarity, potassium levels decrease proportionately **Batavani *et al.*, (2007)**. The composition of ions in milk changes due to mastitis. Increase permeability of the blood-milk barrier results increased in levels of sodium and chloride and decreased levels of potassium. As mentioned above, the enzyme activity in milk increasesdue to high SCC, with proteolytic, lipolytic and bacteriostatic enzymes all being elevated **Munro *et al.*, (1984).**

Regarding to lactate dehydrogenase activity (LDH) showed significant increase in both subclinical and clinical mastitis samples. This inagreement with **Amena *et al.*, (2011)** in camel, **Grun *et al.*, (1992)** in cow and **Batavani *et al.*, (2003)** in sheep, The tissue disturbances of the mammary gland in subclinical and clinical mastitis accompanied by marked increase of LDH activity, it was probably also liberated from disintegrated leukocytes and the parenchymal cells of the udder **Kato *et al.*, (1989).** LDH is a cytoplasmic enzyme and part of the glycolytic pathway.

In the present study total whey protein showed increase in both clinical and subclinical cases of mastitis, while the protein fraction revealed increase immunoglobulin, lactoferrin, and serum albumin percent of total protein. While, α lactoalbumin showed decrease. The increased permeability of the blood-milk barrier allows serum proteins to leak into the milk, which results in higher whey protein content. **(Auldist and Hubble, 1998).**

Immunoglobulins in mastitic milk are serum-derived pass into the milk through the mammary epithelium. The concentrations of immunoglobulins in normal milk are low and depend on the degree of vascular permeability of the udder tissues. When this permeability barrier is broken during inflammation, immunoglobulin concentrations increase in milk from infected glands **(Batavani *et al.*, 2007).** Concerning to α-lactalbumin are largely synthesized in the mammary gland. This decrease in α-lactalbumin associated with mastitis could be due to the reduced synthetic activity of mammary gland. Some studies suggest that α- lactalbumin may leak out of the alveolus between epithelial cells; this component has been measured in urine or blood of cows with mastitis **(McFadden *et al.*, 1988).**

In this study, the contents of LF (an antimicrobial factor) recorded 4.8% of total protein in healthy milk samples. **(Halima *et al.*, 2015)** determined in healthy camel milk 1.95 g/L, also recorded that Camel milk revealed common band with high molecular weight close to lactoferrin (76 kDa for camel milk). Difference in band intensity reflected difference in LF concentration. LF concentration in subclinical mastitic and mastitic samples reach (10.63- 17.7%) respectively. This results similar to that reported by **Giacinti *et al.*, (2013)** who recorded that LF concentration affected by increase in SCC. Moreover **Al-Majali *et al.*, (2007)** recorded in camels significant increase was observed with SCC value greater than 300,000 cells/ml, also demonstrated that a slight elevation of LF with subclinical mastitis, while LF was significantly elevated in clinically affected ones

Conclusion

Mastitis greatly affects camel rearing. Clinical mastits should be controlled to avoid the spread of infection. The early detection and treatment of subclinical mastitis greatly reduces the incidence of clinical mastitis.

It was recommended the use of these antibiotics in combination to avoid the microbial resistance and strict hygienic measures during production and handling of camel milk to reduce public health hazards in addition to increase the awareness of camel owners about the importance of hygienic milking practice to mini-

mize the adverse effect of mastitis on the yield and quality of camel milk.

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دراسات باثولوجية اكلينيكية و بكتيريولوجية على بعض المعزولات البكتيرية فى آلبان الجمال

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الملخص العربى

تم تجميع عدد ١٠٠ عينة حليب من نياق تعانى من التهاب بالضرع وكذلك عدد ٥٠ عينة حليب من نياق مخالطة وسليمة ظاهريا . وقد تم اجراء اختبار الكليفورنيا و العد الخلوى وكذلك الفحوص البكتريولوجية والبيوكيميائة على هذه العينات و أوضحت النتائج أن درجات اختبار الكاليفورنيا ١ و ٢ و ٣ تعد إيجابية لالتهاب الضرع بينما أقل من ذلك يعد سلبياً. و اتضح أن الميكروب العنقودي الذهبي كان أكثر المسببات البكتيرية التي تم عزلها من حالات التهاب الضرع الإكلينيكي و الخفي بنسبة (٢٧%) يليه ميكروب الإي كولاي بنسبة (٢٢.٥%) ثم الميكروب العنقودي السالب لاختبار التلذن بنسبة (١٨%) و الميكروب السبحي الدسأجلاكتيا (١٣.٥%) ثم ميكروب الكوريني بوفيز (٩%) ثم الميكروب السبحي أجالاكتيا (٥.٤%) ثم الكلبسيلا (٤.٥%) **و قد** أجري اختبار الحساسية على المعزولات ضد العديد من المضادات الحيوية و ذلك لاختيار العلاج الأمثل.فى هذة الدراسة وجد زيادة فى الخلايا الجسدية فى عينات اللبن المصابة بالتهاب الضرع الكامن والاكلينيكى اذا ما قورنت بالعينات السليمة . كما اظهر التحليل الكيميائى لمكونات اللبن زيادة فى مستوى الكلوريد والصوديوم و اليوريا و البروتين الكلى و الالبيومينو الاكتوفورينوالامينوجلوبيولين و اللاكتيت ديهيدروجينيز فى كل من عينات اللبن المصابة بالتهاب الضرع الكامن والاكلينيكى. **مع** قلة فى البوتاسيوم والالفا لاكتو البيومين .