

Bacteriological studies on mastitis in dairy Friesian cattle in Quena governorate

Z. M. Sayed¹, A. E. A Mohamed²

¹Animal Health Research Institute Quena , Regional Laboratory and ²Animal medicine college of Veterinary Medicine, South Valley University, Quena, Egypt.

Fifty five milk samples were collected from dairy Friesian cows suffering from clinical mastitis in a farm at Quena Governorate. The samples were subjected to microbiological examination .The main isolated pathogenic bacteria were identified biochemically as *Escherichia coli* (36.3%), *Staphylococcus aureus* (23.6%) *Streptococcus agalactiae* (18.2%), *Klebsiella pneumoniae* (12.7%) and bacterial free samples (9.1%) . Sensitivity tests for the bacterial isolates revealed that the tested strains were sensitive to ciprofloxacin, nortril, gentamicin and lincospectin.

Mastitis is one of the most significant problems in dairy herds and responsible for extended usage of antibiotics in these enterprises (Kromker and Greboski, 2002). Bovine mastitis is an inflammation of the mammary glands, usually due to a microbial infection and considered to be the worldwide costliest production disease in dairy herds (Miller *et al.*, 1993 and Rainard *et al.*, 2003). Mastitis is considered of vital importance due to its association with many zoonotic diseases in which milk acts as a source of infection (APHA, 1993). Bovine mastitis is caused by various bacteria, mycoplasma and fungi (Bourry *et al.*, 1997; Jones *et al.*, 1997) and it resembles urinary tract infection as both are ascending caused by bacteria from the environment (Bocdeker , 2005)

The present work aimed to study the causative agents of mastitis in dairy Friesian cattle in Quena Governorate and sensitivity of the isolated organisms to different antibiotics.

Materials and methods

Milk samples. Fifty five milk samples were collected from dairy Friesian cattle at a farm in Quena Governorate showing clinical signs of mastitis. The samples were taken under aseptic condition and transferred in an ice box to the laboratory.

Bacteriological examination. Milk samples were incubated aerobically at 37°C for 24 h then centrifuged at 3000 rpm for 20 minutes. The supernatant was discarded and a loopful from the sediment was streaked onto the surface of each blood agar and MacConkey agar plates. The plates were incubated at 37°C for 24-48 h, and

examined for bacterial growth. The isolated colonies were identified by their morphological characters, colonial appearance and then picked up, cultured onto slope agar to obtain pure culture. Biochemically identified according to Chruichshank *et al.*, (1975). Sensitivity tests for bacterial isolates were carried out using the disc diffusion methods of susceptibility test according to (Quinn *et al.*, 1994).The antibacterial discs were supplied by (Oxoid) with different concentrations including ciprofloxacin (30µg), rifampicin (5µg), doxycycline (30µg), nortril (10µg), nalidixic acid(30µg), lincospectin (15+200µg), streptomycin (10µg), colistin sulphat (10µg), gentamicin (10µg) , and flumequine (10µg) were used. The medium used in sensitivity tests was nutrient agar (Oxoid) (CM0003) Lot/ 345492.

Results

Isolation and identification of the isolated organisms. The bacteriological examinations of the milk samples collected from mastitic cattle revealed the presence of *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus agalactiae* and *Klebsiella pneumoniae* organisms with variable rates as shown in Table (1).

Discussion

Bovine mastitis is a major disease that affect dairy industry and *E.coli* is one of the most frequently isolated pathogens from both clinical and chronic infections (Bramley *et al.*,1996).The most dominant bacteria in the present study as shown in Table (1) were *E.coli* followed by *S.aureus*, *S.agalactiae*, and *K. pneumoniae* in ratio of 36.36%, 23.63% 18.18%, 12.72%,

Table (1): Microorganisms isolated from examined samples.

Microorganisms	No. of strains	Percentage %
<i>Escherichia coli</i>	20	36.36 %
<i>Staphylococcus aureus</i>	13	23.63 %
<i>Streptococcus agalactiae</i>	10	18.18%
<i>Klebsiella pneumoniae</i>	7	12.72 %
Bacterial free samples	5	9.10 %

Table (2): Antibacterial sensitivity tests of isolated organisms.

	Cip. 30µg	Lin. 15+200µg	Strept. 10µg	Gen. 10µg	Nor. 10µg	Colis. 10µg	Flum. 10µg	Nal. 30µg	Doxy. 30µg	Rif. 5µg
<i>E. coli</i>	+++	+++	—	+++	+++	—	++	+	+	+
<i>Staph. aureus</i>	+++	+++	—	++	+++	—	+	+	+	+
<i>S. agalactiae</i>	+++	+++	—	++	+++	—	+	+	+	+
<i>K. pneumoniae</i>	++	++	—	++	++	+	+	+	+	+

+++ = Sensitive ++ = Intermediat --- = Resistant

Cip: Ciprofloxacin Lin: Lincospectin Strep.: Streptomycin Gen.: Gentamicin Not.: Nortril Colis.: Colistin sulphat, Flum.: Flumequine, Nal.: Nalidixic acid ,Doxy.: Doxycycline, Rif.: Rifampicin.

respectively while bacterial free samples were 9.1%. This result agreed with that recorded by (Gregory and Hoedemaker, 2002; Ahmed *et al.*, 2006) who recorded that most of clinical mastitis in cattle originated from *E.coli* followed by *S.aureus*, *S.agalactiae*, and *K. pneumoniae* in ratio of 51.1 % , 20.7 % , 18.5 % 6.5% , respectively .It was also reported that the incidence of isolation of *E.coli* was 21.05% while *K. pneumoniae* was 6.75% from mastitic dairy buffaloes (Ahmed *et al.*,1988; Shalaby and Salem, 2001). El-Mahrouki *et al.*, (2006) recorded that, *E.coli* isolates from mastitis usually possess one or more virulence properties that may help in establishment at the infection site and subsequently causing a disease condition. Saddek *et al.*,(1999) found that the main causative bacterial agent responsible for subclinical mastitis in dairy cows were *S. aureus* ,*E.coli* , *S. epidermidis* , *S. agalactiae*, *Corynebacterium bovis* , *S. dysagalactiae* and *Citrobacter* in ratio of 29.10%, 20%, 18.20%, 12.7%, 10.90% , 5.46 % , 3.64 % , respectively and these

results agree with the obtained results. Staphylococci are widely distributed in nature as they can grow in any food article if the conditions are suitable .The most important species of Staphylococcus are *S.aureus* due to their pathogenicity and their ability for enterotoxin production (Tsong and Huang, 1993). Sayed (1996) mentioned that the main bacterial causes of mastitis were *E.coli* , *S.subris* , *K. pneumoniae* and *Corynebacterium bovis*, which were recovered from 41.6%, 22.2%, 22.2% and 13.9% of total examined samples respectively. The ability of staphylococci to survive in phagocytes and mammary epithelial cells results in the persistence of infection and development of botryomycosis (Jones *et al.*,1997; Diawa *et al.*, 2003). The results of sensitivity tests using different antibacterial discs cleared that the isolated organisms were sensitive to ciprofloxacin , nortril , gentamicin and lincospectin.

References

Ahmed, E. A.; Abd El-Sangary, H. A. and Abou Zead, A.A. (2006): Bacterial and biochemical studies on mastitis

- of cattle in Sharkia Governorate Assiut Vet. Med. J., 52(109):207-214.
- Ahmed, O. ; Michel, G.; Mounce, D. and Jeep, P. (1988):** Virulence factor and markers in *Escherichia* from calves with diarrhoea .Am.J.Vet .Res., 49(10):1657-1660.
- APHA "American Public Health Association "(1993):** Compendium of Methods for the Microbiological Examination of Foods .INC. 4th ed. New York.
- Bocdeker, E. C. (2005):** Vaccines for enterotoxigenic *Escherichia coli*: current status. Curr Opin Gastroenterol., 21 (1): 15-19.
- Bourry, A.; Cochard, T. and Poutrel, B. (1997):** Serological diagnosis of bovine, caprine and ovine mastitis caused by *Listeria monocytogenes* by using an ELISA. J. Clin. Microbiol., 33: 6.
- Bramley, A. J. ; Harmon, J. ; Smith, K. L. and Hogan, J.S. (1996) :** Current Concept of bovine mastitis ,4 ed. The National mastitis Council Walton Commons West, Masdison , w/53704 (608):224-622 .
- Cruickshank, R.; Dugid, J. R.; Marmion, B. P. and Swain, R. H. A. (1975):** Medical Microbiology :The practice of medical microbiology .12th ed. Vol.2 ,Churchill ,Livingstone , London.
- Diawa , M. S.; Petitcher, D.; Deschenes, E.N.; Grondin, G.; Talbot, B. and Lacasse P. (2003) :**Lactoferrin against *Staphylococcus mastitis*, lactoferrin alone or in combination with penicillin G. on bovine polymorphonuclear function and mammary epithelial cells colonization by *Staphylococcus aureus*. Vet. Immunol. Immunopathol., 95: 33-42.
- El-Mahrouki, A. M.; Nevine, M. Sobhy and Aggour, M.G. (2006) :** Detection of Coliform mastitis in cattle with special refernce to molecular characterization of enterotoxigenic *E.coli* using polymerase chain reaction (PCR) .J. Egypt Vet. Med. Assoc., 66(1)47-58.
- Gregory, A. and Hoedemaker, M. (2002) :** Bovine catarrhal mastitis ,frequency, etiology and therapy .In the proceeding of the XXII world Buiatrics congress ,18-23 August 2002,Hannover Germany.
- Jones, T.; Hunter R. and King N. (1997):** Veterinary pathology. 6th ed. Williams and Wilkins Awavery company, Baltimore, Philadelphia, London.
- Kromker,V. and Grobowski, N.T.(2002) :** Risk factor analysis for mastitis caused by environmental pathogens in the environment of dairy herds . In the Proceeding of XXII World. Buiatrics congress, Hannover, Germany, 18-23 August 2002. pp 141.
- Miller, R. H.; Pape, M.J.; Futton, L. A. and Schtz, M. M. (1993):** The relationship of milk and somatic cell count to milk yeilds for Holistein heifers after first calving. J. Dairy Sci., 76:728-733.
- Quinn, P.J.; Carter, M.E.; Markey, B.K. and Carter (1994):** Clinical Veterinary microbiology. Mosby–Year Book Europe Limited London England 1st Ed.
- Rainard, P.; Corrales, J.C.; Barrio, M.B.; Cochard , T. and Poutrel B. (2003):** Leukcytic activaties of *Staph.aureus* strains isolated from cows,ewes,and goats with mastitis. Clin. Diag. Immunol., 10 (2):272-277.
- Saddek, S.R.; Abd El-Kader, H.A. and Abd El-Hafeez, M.M. (1996):** Bacteriological studies of subclinical mastitis in friesian cattle in assuit Governorate . Assiut Vet.Med. J., 42 (83):77-88.
- Sayed, A.M. (1996):** Bacterial causes and antibiogram of mastitis in dairy friesian cows at Assiut Governorate. Assiut Vet. Med. J., 34(68):22-29.
- Shalaby, B. and Salem, R.M.T. (2001):** Bacteria and fungi as probable of mastitis in dairy buffaloes. J. Egypt Vet. Med. Assoc., 61 (3): 137-144 .
- Tsung , C. and Huang, S. (1993) :** An immune linked immunosorbant assy for rapid detection of *S. aureus* in processed food. J. Food Prot., 75 (3):184-18 .

دراسات بكتريولوجية على التهاب الضرع في الابقار الفرزيان الحلابة في محافظه قنا

أجريت هذه الدراسة على خمسة وخمسين عينة لبن جمعت من أبقار فرزيان حلابة كانت تعاني من التهاب ضرع ظاهري في إحدى مزارع الألبان في محافظة قنا وقد تم فحص العينات بكتريولوجيا وتحديد المسببات البكتيرية ونسبها وكانت كالاتي ، ميكروب القولوني (36.36%) ، الميكروب العنقودي الذهبى (23.63%) ، الميكروب السبحى (18.18%) ، الكليبسيلا (12.72%) ، وعينات لم يتم عزل أى بكتريا منها (9.1%)، وقد تم اختبار حساسية الميكروبات المعزولة لعدد من المضادات الحيوية فكان أكثرها تأثيرا السيبروفلوكساسين ،النوراتريل ، جنتاميسين و اللينكوسبكتين .