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Bacterial Abscessationin Sheep and Goat in Giza Governorate with Full Antibiogram Screening

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Abstract: The appearance of abscesses in sheep and goats create a marketing problem. Animals with abscesses may become anemic and emaciated result in loss of the animal's value by wasting, death or carcass condemnation or by decrease in reproductive and production efficiency.The present study was designed to throw light on the bacterial causes of abscess formation in sheep and goats. This study was conducted on 120 pus swab samples were collected from El-Monib abattoir, Giza. Samples include 20 living Balady sheep (1-3 years old), 44 living goats (1-3 years old) and 56 male slaughtered Balady sheep (1-2 years old). One hundred and forty three bacteria were isolated and identified as follow; *C. pseudotuberculosis* (33.4%), *C. ulcerans* (12.5%), *S. aureus* (20.8%), *S. epidermidis* (1.7%), *Micrococcus* spp. (6.7%), *E. coli* (20.8%), *Citrobacter* spp. (4.2%), *K. pneumoniae* (7.5%), *P. vulgaris* (4.2%) and *P. penneri* (7.5%). Full antibiogram was carried out for the predominant isolates which proved that corynebacterium isolates were 100% sensitive to Ciprofloxacin and Trimethoprim/sulfamethoxazole, while staphylococcus isolates were 100% sensitive to Amikacin, Ciprofloxacin, Gentamicin, Neomycin, Novobiocin, Streptomycin,Vancomycin.In conclusion, there should be an effective control program for prophylaxis of abscess formation in sheep and goats and to choose the most effective antibacterial agents.

Key words: Abscess · Sheep · Goat · Bacteria · Antibiotic Sensitivity

INTRODUCTION

The occurrence of abscesses is one of the health problem which affects sheep and goats in Egypt as wellas all over the world, mainly lymph nodes (superficial and internal), skin and visceral organs. These seem tohave increasing incidence as evidenced by the records of veterinary hospitals, slaughter houses and the information derived from animal owners and field veterinarians. In recent years the appearance of abscesses in sheep and goats create a marketing problem because of several factors. Animals with abscesses may become anemic and emaciated. Caseous lymphadenitis (CLA) may result in loss of the animal's value by wasting, death or carcass condemnation or by decrease in reproductive and production efficiency [1, 2].

The abscesses sometimes impart result in a disagreeable odour to meat thus reducing meat quality with consequent reduction in meat demand. Substantial amounts of meat may be wasted through trimming of abscesses at meat inspection and even whole carcasses may be condemned on account of generalized abscesses. In addition, superficial abscesses may decrease skin quality. These factors cause economic losses. Abscess disease was recognized for the first time in the world in France by Morel [3] and was later reported by several other French scientists [4-11]. The etiology of these abscesses has not been largely investigated in Egypt. Many pyogenic organisms may be involved including species of the genera Streptococcus, Staphylococcus, Corynebacterium, Pseudomonas and others [12].

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Among these organisms *Corynebacterium pseudotuberculosis, Staphylococcus aureus* and *S. aureus* subspecies *anaerobius* cause distinct disease entities, caseous lymphadenitis, tick pyemia and abscess disease, respectively [13] and are known to cause serious health problems in many parts of the world. Therefore, the present work was designed to investigate the problem of abscesses in sheep and goats.

MATERIALS AND METHODS

One hundred and twenty pus swabs were collected from 20 living Balady sheep (1-3 years old), 44 living goats (1-3 years old) and 56 Balady sheep slaughtered males (1-2 years old) that were taken from El-Monib abattoir, Giza. These samples were obtained from suppurating lymph nodes, open abscesses and closed abscesses of sheep and goats.

Collected Swab Samples Were Streaked Onto: Blood agar plates, MacConkey agar plates as well as mannitol salt agar plates. All samples were streaked in duplicate plates and incubated aerobically and anaerobically for isolation of aerobic, facultative anaerobic as well as anaerobic bacteria found in sample. Aerobic plates were incubated at 37°C for 24 hrs. However, anaerobic plates were incubated anaerobically in an anaerobic jar and were incubated at 37°C for 48-72 hrs.

Identification of bacterial isolates was carried out by Microscopical identification according to Cruickshank *et al*. [14] as well as Biochemical identification which was carried out according to Funk *et al.* [15] for Gram positive coccobacilli, according to Quinn *et al.* [16] for Gram positive cocci and according to Cruickshank *et al*. [14] for Gram negative bacteria.

Antibiotic Sensitivity Test for Identified Strains: Fifteen standard antibiotic discs were used in monitoring the antibiotic sensitivity of the tested isolates which was carried out after preparation of the standardized inoculums matching with 0.5 McFerland tube by adding sterile nutrient broth. Then Muller Hinton agar plates were inoculated with the standardized bacterial suspension with even distribution of the inoculum all over the plates and remain for 3- 5 minutes to allow the absorption of excess moisture then the discs were applied using the pointed forceps the selected antibacterial discs were placed onto the surface of inoculated plate and pressed firmly on the agar and then plates were incubated at 37°C for 24 hours. Reading of the results was carried out after incubation; the degree of sensitivity was determined by measuring the zone of growth inhibition produced by diffusion of the antibiotic agents from the discs into the surrounding medium. The result was interpreted according to Oxoid Manual [17], Koneman *etal.* [18], NCCLS [19] and Bell *et al.* [20].

RESULTS

One hundred and twenty pus swabs were collected from 20 living Balady sheep (1-3 years old), 44 living goats (1-3 years old) and 56 slaughtered Balady sheep males (1-2 years old) that were taken from El-Monib abattoir, Giza. The bacteria isolated from 143 samples and identified as 40 *C. pseudotuberculosis* (33.4%), 15 *C. ulcerans* (12.5%), 25 *S. aureus* (20.8%), 2 *S. epidermidis* (1.7%), 8 *Micrococcus* spp. (6.7%), 25 *E. coli* (20.8%), 5 *Citrobacter* spp. (4.2%), 9 *K. pneumoniae* (7.5%), 5 *P. vulgaris* (4.2%) and 9 *P. penneri* (7.5%).

Bacterial Isolation and Identification: Abscess swabs were cultured onto blood agar at 37°C / 48 hours, after incubation, out of 120 samples collected from sheep and goats showing abscessation, fifty five isolates exhibited the typical colonial character of *Corynebacterium* spp. The colonies appeared smooth, white, opaque, flat, circular and small in size. Moreover, the colonies were surrounded by narrow zone of ß-hemolysis on blood agar. Biochemical characteristics of the isolated Corynebacterium show that 40 isolates were biochemically characterized as *C. pseudotuberculosis* (72.73%) showing positive catalase, urease, glucose, maltose fermentation and negative starch and trehalose fermentation, negative gelatin liquefaction and nitrate reduction. On the other hand, 15 isolates were biochemically characterized as *C. ulcerans* (27.27%) showing positive catalase, urease, gelatin liquefaction and fermented glucose, maltose, starch and trehalose with negative nitrate reduction test.

Abscess swabs were cultured onto mannitol salt agar at 37°C / 48 hours. After incubation, out of 120 samples collected from sheep and goats showing abscessation, Thirty-five isolates exhibited the typical colonial suspected to be Gram positive cocci. On nutrient agar; most colonies appeared golden yellow (yellow and cream to buff varieties), smooth, opaque, circular and medium in size. Moreover, on blood agar; the colonies were surrounded by zone of ß-hemolysis. While on mannitol salt agar; they were yellow colour surrounded by yellow halo with yellow colored medium. The non-haemolytic

Table 1: Number of closed and opened abscess in Living and Slaughtered sheep and goat:

	Closed abscess		Opened abscess		Total	
Lesion Animal	No.	%	No.	%	-No.	%
Sheep	60	50	16	13.33	76	63.33
Living	4	6.66	16	100	20	26.32
Slaughtered	56	93.34	-	-	56	73.68
Goat	35	29.16	9	7.5	44	36.67
Living	35	100	9	100	44	100
Slaughtered	-	-	-	-	-	-
Total	95	79.17	25	20.83	120	100

Table 2: Bacteria isolated from Abscess in sheep and goats:

Animal Species	Sheep (76)		Goat (44)		Total (120)	
Bacterial isolates	No	%	No	%	No	%
Gram negative bacteria						
E. coli	15	19.74	10	22.73	25	20.83
*Citrobacter*spp.	5	6.58	0	0	5	4.17
Klebsiellapneumoniae	7	9.21	2	4.55	9	7.50
P. vulgaris	5	6.58	0	0	5	4.17
P. penneri	6	7.89	3	6.82	9	7.50
Gram positive bacteria						
C. pseudotuberculosis	20	26.32	20	45.45	40	33.34
C. ulcerans	10	13.16	5	11.36	15	12.50
S. aureus	20	26.32	5	11.36	25	20.83
S. epidermidis	0	0	2	4.55	2	1.67
Micrococcus spp.	8	10.53	0	0	8	6.67

Table 3: Antibiogram of Reference Drugs against Bacterial Isolates causing Abscessiation in sheep and Goat.

Bacteria isolates	*Corynebacterium* 55 isolates		*Staphylococcus* 35 isolates		Gram negative bacteria 53 isolates	
Antibiotics	Sensitive	Resistant	Sensitive	Resistant	Sensitive	Resistant
Amikacin	87.27	-	100	-	90.57	-
Ampicillin	*	94.29	-	*		
Augmentin	*	91.43	-	*		
Ciprofloxacin	100	-	100	-	100	-
Gentamicin	81.82	-	100	-	-	90.57
Erythromycin	*	91.43	-	*		
Metronidazole	-	87.27	-	71.43	-	100
Neomycin	83.64	-	100	-	*	
Novobiocin	80	-	100	-	81.13	
Penicillin G	-	90.91	74.29	-	*	
Rifampicin	-	78.18	85.71	-		81.13
Streptomycin	94.55	-	100	-	100	-
Trimethoprim/sulf-amethoxazole	100	-	94.29	-	100	-
Vancomycin	-	100	100	-	-	100
Tetracycline	80	-	71.43	-	-	77.36

No = number of positive samples.

% = was calculated according to number of examined samples.

(*) The Antibiotics showing intermediate zone of inhibition with tested isolates

Photo: Plates showing Antibiotic inhibitory zones

white colonies on blood agar, showed pink colonies on mannitol salt agar. Gram positive cocci arranged in clusters like bunch of grapes. They were biochemically characterized asout of 100 cocci isolates, Twenty five were *S. aureus* isolates (71.43%) were catalase and coagulase positive, fermented maltose, trehalose, mannitol and sucrose. Two *S. epidermidis* isolates (5.72%) were catalase positive and ferment sucrose. While coagulase negative and did not ferment maltose, trehalose and mannitol. Eight *Micrococcus* isolates (22.85%) were catalase positive, coagulase negative and showed oxidative reaction (O) in the O/F test.

Isolation and Identification of Gram Negative Isolates:

A. Colonial Characters: Abscess swabs were cultured onto MacConkey agar at 37°C / 48 hours. After incubation, out of 120 samples collected from sheep and goats showing abscessation, Fifty three isolates exhibited the typical suspected to be Gram negative medium size bacilli with colonial characters as smooth, flat, circular and medium in size, either lactose fermenter colonies (appeared pink on MacConkey agar) or non-lactose fermenter (colorless). Biochemical characteristics of the isolated Gram negative bacteria revealed the isolation of 25 *E. coli* isolates (47.17%), 5 Citrobacter spp. (9.44%), 9 *K. pneumonia* (16.98%), 5 *P. vulgaris* (9.44%), *9 P. penneri* (16.98%).

DISCUSSION

Sheep and goats constitute one of the major sectors of the animal wealth in Egypt and contribute significantly to the domestic meat demand. Most of the sheep and goats face the risk of bacterial diseases caused by various pyogenic organisms which often cause abscess formation in various body sites. Appearance of abscesses in sheep and goats creates a marketing problem due to decline of the meat quality and quantity and condemnation of the affected portions and internal organs. Animals with abscesses may become anemic and emaciated, which leads to significant economic losses due to loss of body weight, drop in birth rates and reduction in the milk production. The main source of infection and potential spread of the organism is via the rupture of affected lymph nodes and abscesses.

The present work focus on the isolation and identification of bacteria causing abscessation in sheep and goats. A total of 143 bacterial isolates were recovered from 120 animals showing abscesses from the different regions in Giza governorate Table (2). *C. pseudotuberculosis* was the most predominating organism followed by *S. aureus* then Gram negative bacteria which share in abscess formation.

The results of the survey on the prevalence of abscesses in sheep and goats resulted in isolation of 143 bacterial isolates including 40 *C. pseudotuberculosis*, 15 *C. ulcerans,* 25 *S. aureus,* 2 *S. epidermidis,* 8 Micrococcus spp., 25 *E. coli*, 9 *K. pneumoniae,* 9 *P. penneri,* 5 *P. vulgaris* and 5 *Citrobacter* spp.

Brown and Olander [21] proved that caseous lymphadenitis which is caused by *C. pseudotuberculosis* has been and continues to be the most common pyogenic affection causing serious problem for goat and sheep industries. It is a worldwide chronic infectious disease of small ruminants characterized by formation of pyogranulomas mainly in the superficial lymph nodes and visceral lymph nodes and organs [22]. The prevalence of CLA in the present work was 26.32% in sheep and 45.45% in goats with total prevalence of both of CLA 33.34%. The prevalence of CLA in slaughtered sheep was 32.65% according to Baird and Fontaine [22], while Al-Gaabary *et al.* [23] reported that the prevalence was 22.10% in sheep.Al-Gaabary *et al.* [24] reported CLA at Tanta abattoir, Egypt. The prevalence of CLA among slaughtered animals was 26.92% and 25.05% in sheep and goats, respectively. Pavan *et al.* [25] reported that caseous lymphadenitis, has a high prevalence in many regions of the world, including Argentina and Brazil.

Almost this incidence is more or less similar to the result of isolation and detection of *C. pseudotuberculosis* in the present work which was 26.32% in sheep and 45.45% in goats. Batey [26] reported prevalence of CLA to be 54% in sheep and goats. Also, Brown and Olander [21] reported much lower prevalence in sheep and goats (13.9%) if compared with the data obtained in present investigation which was 33.34% in sheep and goats. Much lower results were recorded by Ghanbarpour and Khaleghiyan [27] reported a prevalence of 1.1% in goats. Moreover, Cetinkaya *et al.* [28] reported much lower prevalence of 3.5%. Also, Baird and Fontaine [22] reported that prevalence of CLA in slaughtered goats was 5.55%. As well as Al-Gaabary *et al.* [23] reported the prevalence was7.77% in goats.

The difference between the obtained result and the other lower prevalence may be attributed to the differences in the management of animals included in each study. In Egypt, there is a minor degree of care and hygiene during shearing process. Also, most owners do not care to cull any animal showing superficial abscesses or progressive emaciation. That leads to an increased prevalence of CLA among animals in Egypt. The differences between the obtained results and the other higher prevalence may be due to the different ways by which sheep and goats were raised up; using neck collar for each individual animal, application of ear tags and docking which is not usually applied in Egypt.

Infection with *C. pseudotuberculosis* has been reported in many farm animals, the bacterium was isolated from infected sheep, goats, buffaloes, cattle, horses as well as from wild animals [29-33]. The infection in sheep and goats is usually chronic in nature and abscesses were confined to superficial and internal lymph nodes. Sometimes abscesses may occur in the liver, spleen and lung [34, 35]. The sheep and goats showed no clinical signs other than enlargement and abscessation of one or more peripheral lymph nodes [36, 37].

Biochemical identification was performed according to the criteria necessary for identification of Corynebacteria. The following tests were done as they are considered the key reaction for the differentiation of Corynebacteria [15]. Results concluded that all *C. pseudotuberculosis* isolates were nitrate negative, urease positive, catalase positive, glucose positive and all isolates were terhalose negative. Fermentation of terhalose and hydrolysis of starch were considered as characteristic criteria for distinguishing *C. ulcerans* from *C. pseudotuberculosis* [38]. Trehalose fermentation, starch hydrolysis and gelatin liquefaction were used for differentiation between *C. ulcerans* and *C. pseudotuberculosis*.

Economically, CLA is responsible for the meat condemnations of sheep and goats carcasses at abattoirs. Udder abscesses will affect milk production. The milk obtained from affected animals will be discarded. Moreover, the whole udder may indurate with total loss of function. This reduce female animals valuedue to decreased milk production as well as decrease in wool production which causes an annual loss of about $ 17 million in wool production to the Australian wool industry [39]. In Egypt, Seddik *et al*. [40] reported that losses to sheep production due to *C. pseudotuberculosis* were estimated to be 10 million Egyptian pounds annually.

S. aureus was the second important bacterial pathogen recovered from 26.32% in sheep and 11.36% in goats with total prevalence of 20.83% in both sheep and goats. *S. aureus* is a very important bacterium that shared in formation of abscessation as well as serious purulent infections [41]. It is responsible for a wide range of both acute and chronic infections in sheep and goats. Also, it spreads in the environment and allover the skin of both human and animals. Therefore *S. aureus* is very likely transmitted by wounds obtained during either animal activities or shearing. Ashok and Kashyap [42] recorded the recovery of 144 isolates of *S. aureus* from milk and pus samples of camel, goats and cattle. The maximum 58% of isolates were obtained from abscesses and minimum 41% from mastitic milk samples. Tajik *et al.* [43] bacteriological examinations of 434 goats showed that 57 goats (13.13%) were infected with subcutaneous abscesses with the isolation of *S. aureus* and *S. epidermidis*. This agrees with the results of the present investigation where prevalence of *S. aureus* was 26.32% in sheep and 11.36% in goats with a total prevalence of 20.83% in both diseased sheep and goats.

Ata [44] examined 825 samples from various animal species and isolated 175 *S. aureus* from them. She identified those isolates to be positive coagulase, haemolysin, thermonuclease, phosphatase, lipase, deoxyribonuclease, pigment production, tellurite and nitrate reduction and mannitol and glucose fermenters and found that all isolates were staphylokinase positive and novobiocin sensitive. Murray *et al.* [41] mentioned that the key characters for *S. aureus* are colony pigment, free coagulase, clumping factor, protein A, heat-stable

nuclease and acid production from mannitol. This agree with the present work, where twenty-five *S. aureus* isolates from diseased sheep and goats were identified microscopically and biochemically showing catalase and coagulase positive, fermented maltose, trehalose, mannitol and sucrose.

On the other hand, the role of the Gram negative bacteria was investigated in the present work. Fifty-three Gram negative bacteria out of 143 bacterial isolates were differentiated to 25 *E. coli* (20.8%), 5 *Citrobacter* spp. (4.2%), 9 *K. pneumoniae* (7.5%), 5 *P. vulgaris* (4.2%) and 9 *P. penneri* (7.5%). These Gram negative bacteria weren't isolated in pure culture in any examined abscess, but they were isolated from abscesses in mixed form with either *Corynebacterium* spp. or *Staphylococcus* spp. Further investigations may be needed to ensure if they have ability to induce abscess in pure culture or they come as a secondary microorganism behind the pathogenic one.

An antibiogram study was carried out on all isolates; the result in Table (3) clearly indicated that, the Corynebacterium isolates were 100% sensitive to Ciprofloxacin and Trimethoprim/sulfamethoxazole, Streptomycin (94.5%), Amikacin (87.2%), Neomycin (83.6%), Gentamicin (81.8%), Tetracycline (80%), Novobiocin (80%), Ampicillin (56.3%), Augmentin (Amoxicillin/ Clavulanic acid) (47.2%) and Erythromycin (29%). While 100%, 90.9%, 87.27% and 78.18% of the isolated Corynebacterium were resistant to Vancomycin, Penicillin G, Metronidazole and Rifampicin, respectively. *In vitro* sensitivity of Corynebacterium isolates toward antibiotics varies in different regions [33, 45]. Muckle and Gyles [46] examined 26 strains isolated from lesions of CLA in goats. All of isolated strains were sensitive to Ampicilin, Chloramphenicol, Lincomyicin, Gentamicin, Tetracycline and Penicillin G. Judson and Songer [47] determined the activity of 39 antimicrobial agents against 54 isolates of *C. pseudotuberculosis* which reveals that the most active agents were Penicllins, Macrolides, Tetracyclines, Cephalosporins, Lincomycin, Chloramphenicol and Rifampicin. On the contrary, most of the isolates were resistant to Aminoglycosides, Nitrofurans, Polymyxins, Nalidixic Acid and Cyclohexamide. Zhao *et al.* [48] determined the anti microbial activity of 23 agents against 85 *C. pseudotuberculosis* isolates from sheep in Japan, which show that Pencillin G, Ampicillin, Erythromycin and Bacitracin exhibited marked antimicrobial affect. Mohan *et al.* [49] tested the antibiotic sensitivity of *C. pseudotuberculosis* isolated from sheep and goats as well as reference strains, results showed sensitivity to Chloramphenicol, Penicillin, Ampicillin, Neomycin, Erythromycin, Gentamicin, Streptomycin, Polymyxin and Tetracycline and resistance to Colistin. Hassan *et al.* [37] stated that *C. pseudotuberculosis* isolates antimicrobial susceptibility pattern revealed that, all isolates were susceptible to Doxycycline; Apramycin; Cefoperzone; Lincomycin; Rifamycin and Tylosin, with complete resistance to Colistin; Nitrofurantion; Penicillin and Erythromycin. From the obtained data drugs of choose for treatment of Corynebacterium infection were Ciprofloxacin, Trimethoprim/sulfamethoxazole, Streptomycin, Amikacin, Neomycin, Gentamicin, Tetracycline and Novobiocin. These results agree with [49, 37].

In Table (3) the result clearly indicated that, the Staphylococcus isolates were 100% sensitive to Amikacin, Ciprofloxacin, Gentamicin, Neomycin, Novobiocin, Streptomycin, Vancomycin, Ampicillin (94.29%), Trimethoprim/sulfamethoxazole (94.29%), Augmentin (91.43%), Erythromycin (91.43%), Rifampicin (85.71%), Penicillin G (74.29%), Tetracycline (71.43%) and Metaronidazole (28.57%). While 71.43% of the Staphylococcus isolates were resistant to Metaronidazole. *S. aureus* infections were treated by drainage of pus, removal of any devices associated with infection and Penicillins to which they were susceptible, this drug was used for prophylaxis and treatment of *S. aureus* infections, until *S. aureus* producing penicillinase emerged rendering almost now these drugs useless. The next generation of Penicillins, the Methicillin family was resistant to penicillinase and these are still widely used, until the first Methicillin-Resistant *S. aureus* (MRSA) was described in the 1960s [50]. More recently, MRSA have become more wide spread and these strains cause severe skin and soft tissue infections [51]. In the present investigation about 74.3% of the isolated *S. aureus* were sensitive to Penicillin G. Resistance to a range of other antibiotics is found in *S. aureus*, though few strains are resistant to all of the used antibacterial agents. The results recorded in the present work showed that all tested *S. aureus* isolates were susceptible to Vancomycin. However, the first cases of fully Vancomycin resistant *S. aureus* were described in 2002 in human and the numbers of cases are steadily increasing. The difference in susceptibility of *S. aureus* between the

results obtained in the present investigation and that reported by Zhu *et al*. [52] may be due to the fact that Vancomycin isn't used in veterinary medicine in Egypt and could be a direct result to the very expensive price of such antibiotics and other newly antibacterial agents.Guler *et al*. [53] isolated two hundred sixty five *S. aureus* and tested for susceptibility to Penicillin, Ampicillin, Amoxicillin/ Clavulanic acid, Oxacillin, Oxytetracycline, Enrofloxacin, Kanamycin-Cephalexin and Trimethoprim/Sulfamethoxazole using the agar disc diffusion test and also tested for B-lactamase production. A total of 29.8% of the strains were susceptible to all antimicrobial agents were tested; the highest resistance was detected in 63.3% of the strains against B-Lactam antibiotics, Penicillin and Ampicillin. Oxytetracycline resistance was shown in 27.9% of the strains, either alone or in combination with B-lactams. No resistance was detected for Amoxicillin/ Clavulanic acid, Enrofloxacin and Kanamycin-Cephalexin. Udo *et al*. [54] examined 1846 *S. aureus* isolates to investigate the prevalence of antibiotic resistance among *S. aureus* isolated in Kuwait and found that Methicillin resistance was detected in 30% of the isolates, Methicillin Resistant *S. aureus* (MRSA) consisted of 78% multi-resistance and 22% non multi-resistant and reported that the proportion of isolates resistant to Gentamicin, Kanamycin, Erythromycin, Tetracycline, Ciprofloxacin, Fusidic Acid and Trimethoprim was higher among (MRSA) than Methicillin susceptible *S. aureus* (MSSA) isolates. Tiwari *et al*. [55] studied the antibiotic susceptibility of 162 strains of *S. aureus* using disc diffusion method and found that one hundred and twelve (69.1%) were Methicillin resistant. Of 112 MRSA strains 45 (40.1%) were multi-drug resistant. All MRSA strains were found resistant to Penicillin and 91.9%, 87.4%, 77% and 55.5% were resistant to Amoxicillin, Ampicillin, Trimethoprim/ Sulfamethoxazole and Cephalexin, respectively. However, low resistance was observed with Amikacin (19%), Ciprofloxacin (26.5%) and Norfloxacin (30.6%). All strains were sensitive to Vancomycin. Virdis *et al*. [56] studied the antimicrobial resistance patterns in 25 *S. aureus* and 75 coagulase negative staphylococci (CNS) strains and found that 56% of *S. aureus* and 41.3% of CNS isolates were resistant to one or more antimicrobial agents, *S. aureus* showed the highest resistance rate against Kanamycin 28%, Oxytetracycline 16% and Ampicillin 12%. The CNS was found more frequently resistant to Ampicillin (36%) and Kanamycin (6.7%). From the obtained data of the present work drugs of choose for treatment of *S. aureus* infection are Amikacin, Ciprofloxacin, Gentamicin, Neomycin, Novobiocin, Streptomycin, Ampicillin, Trimethoprim/sulfamethoxazole, Augmentin, Erythromycin, Rifampicin, Penicillin G and Tetracycline. This result is agreement with the aforementioned investigators.

CONCLUSION

There should be an effective infection control program to coordinate implementation of policies required for prophylaxis of abscess formation in animals particularly sheep and goats and to choose the most effective antibacterial agent/s because antibiotic resistance is common in Egyptian isolates. Proper treatment is required to prevent spread of Abscessiation and drug-resistance toward bacterial agents. The work team recommended the use of Ciprofloxacin and Trimethoprim/sulfamethoxazole for the treatment of Corynebacterial infections as well as Amikacin, Ciprofloxacin, Gentamicin, Neomycin, Novobiocin, Streptomycin, Vancomycin for treatment of Staphylococcal infection.

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