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Antibiogram of aerobic bacterial flora of footrot

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Footrot is a specific contagious disease of the epidermal structures of the interdigital skin and claws of small ruminants, or more properly an infectious syndrome, caused by the synergistic action of certain bacterial species of which, the *Dichelobacter nodosus* (*D. nodosus*) is the main transmitting agent. The disease is characterized by an exudative inflammation with a strong, characteristic odour, followed by necrosis of the epidermal tissue of the hoof. The infection is specific to sheep and goats, although it is also reported in cattle, horse, pigs, deer and moufflon (Beveridge 1967). It is thought that initial invasion of epidermis by *D. nodosus* paves the way for invasion by other bacteria present in the soil. Other bacteria include strict anaerobes like *Fusobacterium necrophorum, Prevotella* spp., *Porphyromonas* spp., *Clostridium spp.* etc. (Jimenez *et al.* 2003) and aerobes like *Staphylococci* spp and *Streptococci* spp. (Katich 1979). The information regarding aerobic bacterial flora present in footrot lesions in sheep and goats is scanty. In India, there is hardly any report available regarding the footrot. Previously, Darzi *et at.* (2002) described the gross and microscopic lesions, while investigating an outbreak of footrot in a flock of sheep at highland pasture in Kashmir during July-September 2001. Wani *et al.* (2004) are first to detect the *D. nodosus* in clinical cases of ovine footrot in India, and identified it as serogroup B by molecular techniques. Present communication appears the first attempt in India to study the *in-vitro* antibiogram of aerobic bacterial flora of footrot in sheep and goats.

Exudates of footrot lesions were collected during February 2003 to June 2004, from naturally infected 72 sheep and 20 goats of private owners in Kashmir. Samples were collected on cotton swabs, transported to the laboratory on ice and immediately processed for bacterial examination.

All the samples were initially inoculated into nutrient broth for overnight incubation at 37°C. The broth cultures were streaked on blood agar and MacConkey agar plates and incubated as before. The isolated colonies were picked up from both the plates to nutrient agar slants as pure cultures and subjected to standard morphological and biochemical tests for identification of the organisms (Buchanan and Gibbon 1994). The *in vitro* susceptibility of isolates to antimicrobial agents (Table 1) was determined by single disc diffusion method described by Bauer *et al.* (1966).

Total number of bacterial isolates and their distribution is depicted in Table 1. There seems no report available on isolation of bacteria from footrot lesions from India to compare the results. However, the isolation of *Xenorhabdus* spp, *Citrobacter diversus, Erwinia herbicola* (3.38%), *Proteus mirabilis, Pseudomonas aeruginosa, Enterobacter asburiae, Tatumella* spp., *Moellarella* spp., *Budvicia aquatica, Acinetobacter calcoaceticus, Providencia* spp., *Leminorella* spp. bacteria differed to those isolated from other pyogenic infections of animals in Kashmir (Wani *et al.* 2003).

The results of *in-vitro* antibiotic sensitivity tests are also presented in Table 1. Gentamicin and enrofloxacin were most effective antibiotics as all the isolates of the present study were sensitive to them. While as 78.81% of isolates were sensitive to amikacin, 74.57% to oxytetracycline, 72.03% to ciprofloxacin, 65.25% to amoxycillin and 31.35% to penicillin G. However, majority of the isolates were resistant to ampicillin/cloxacillin and streptomycin. There are no reports available to compare the results. Resistance of different bacterial isolates to ampicillin/cloxacillin observed in present study was similar to that observed with bacterial isolates of other pyogenic infection in different animal species in this geographical area (Wani *et al.* 2003). These findings might be due to indiscriminate and extensive use of these antibiotics in veterinary practice. Emergence of these drug resistant isolates cautions us about indiscriminate use of antibiotics in clinical cases of footrot.

SUMMARY

Present study describes the isolation, identification and *in-vitro* antibiotic sensitivity pattern of aerobic bacterial flora associated with clinical cases of footrot in sheep and goats in

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Table 1. *In-vitro* antibiotic sensitivity patterns of aerobic bacterial isolates from footrot samples

Bacterial species	No of isolates (%)	No of isolates sensitive to								
		G	O	C_p	Ax	Ex	P	Am	S	Ak
Escherichia coli	73 (61.86)	73	53	62	24	73	16	57	7	64
Staphylococcus aureus	15 (12.7)	15	15	0	14	15	12	2	15	11
Erwinia herbicola	04 (3.38)	4	3	2	3	3	1	3	2	1
Enterobacter aburiae	01 (0.84)	1	1	0	1	1	0	1	1	0
Tatumella spp.	01 (0.84)	1	1	1	1	1	1	0	1	1
Moellarella spp.	01 (0.84)	1	1	0	1	1	1	0	1	1
Xenorhabdus spp.	08 (6.77)	8	4	6	2	8	2	1	2	3
Proteus mirabilis	03 (2.54)	3	3	3	0	3	1	3	0	3
Citrobacter diversus	05 (4.23)	5	4	5	0	5	1	5	0	3
Budvicia aquatica	01 (0.84)	1	1	0	1	1	1	0	1	1
Acinetobacter calcoaceticus	01 (0.84)	1	0	1	0	1	0	1	0	1
Pseudomonas aeruginosa	03 (2.54)	3	1	3	0	3	1	2	0	2
Providencia spp	01 (0.84)	1	0	1	0	1	0	0	0	0
Leminorella spp	01 (0.84)	1	0	1	0	1	0	1	0	0
Total	118	118	88	85	47	118	37	77	30	91

G, Gentamicin; O, oxyteracycline; Cp, ciprofloxacin; Ax, ampicillin/cloxacillin; Ex, enrofloxacin; P, penicillin G; Am, amoxycillin; S, streptomycin; Ak, amikacin.

Kashmir valley. aerobic bacterial strains 118 belonging to 14 bacterial species were isolated from footrot lesions of 72 sheep and 20 goats. The bacterial species most frequently isolated was *Escherichia coli* followed by *Staphylococcus aureus, Xenorhabdus* spp, *Citrobacter diversus, Erwinia herbicola, Proteus mirabilis, Pseudomonas aeruginosa*. Gentamicin and enrofloxacin were found most effective antibiotics as all the isolates were sensitive to them. This was followed by amikacin, oxytetracycline, ciprofloxacin, amoxycillin and penicillin G. While as majority of the isolates were resistant to ampicillin/ cloxacillin and streptomycin.

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