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In vitro Sensitivity of Commonly Used Antibiotics in Cattle of Kashmir Valley

Z.A. Akhoon[1], M. Shaheen[1], A. Muhee[1], S.A. Hussain[1], A.Q. Mir[1], D.M. Makhdoomi[1], Z.A. Pampori[1], S.A. Kamil[1], Snober Irshad[1]

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ABSTRACT

Background: Antibiotic sensitivity testing is a very important tool in the hands of a clinician to evaluate the sensitivity of the pathogen involved in a disease. It is an important aspect of rational use of antibiotics thus minimizing the risk of occurrence of drug residues in animal foods like milk and meat.

Methods: The samples from mastitic milk and respiratory and urinary samples from the cattle having the respective infections collected from Veterinary Clinical Complex, FVSc Shuhama from July 2021 to January, 2022 were subjected to *in vitro* antibacterial sensitivity testing to six commonly used antibiotics *viz*. gentamicin, enrofloxacin, tetracycline, streptomycin, ceftriaxone and pencillin.

Result: A total of 30 mastitic milk samples, 8 from respiratory infections and 6 from urinary infections were studied. The drug gentamicin proved to be most efficacious against these infections while the drug pencillin proved to be most resistant. Gentamicin proved to be 73.34% efficacious while Pencillin proved to be only 6.67% efficacious in mastitic milk sample from cattle.

Key words: Antibiotics, Drug, Efficacious, Infections, Mastitic.

INTRODUCTION

Antibiotic sensitivity testing or Antibiotic susceptibility testing is the measurement of sensitivity of bacterial pathogens to antibiotics. Knowledge of what antibiotics a bacterial pathogen is sensitive to can change the prescription of antibiotics from empiric therapy to rational therapy. It can indirectly contribute to curb the menace of antibiotic resistance and accumulation of antibiotic residues in foods like milk and meat which can ultimately lead to judicious use of antibiotics being the current demand in one health context.

MATERIALS AND METHODS

During the year July, 2021 to January, 2022, a total of 44 samples, 30 of mastitic milk from cattle, 8 of respiratory infections and 6 of urinary infections were collected from Veterinary Clinical Complex, FVSc and AH, Shuhama, SKUAST-Kashmir and referred to Division of Clinical Veterinary Medicine of the faculty. The samples were collected aseptically in sterile vials.

Sensitivity of the samples was determined on the basis of disc diffusion method as suggested by Bauer *et al.*, (1966). The media and chemicals were used from Hi-media and prepared in laboratory of the division as per the standard procedures. The plates were incubated at 37 degree centigrade for 24 hours and zones of inhibition were measured after 24 to 48 hours of incubation after placing the antibiotic discs equidistantly in the agar plates. The antibiotic discs of commonly used antibiotic in commonly encountered infections of cattle were used. A total of 6 antibiotic discs ie. Gentamicin, Tetracycline, Streptomycin, Enrofloxacin, Ceftriaxone and Pencillin were used. The interpretation was made as per the chart provided by Hi-media (Mumbai).

[1]Division of Clinical Veterinary Medicine, Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar-190 025, Jammu and Kashmir, India.

Corresponding Author: Z.A. Akhoon, Division of Clinical Veterinary Medicine, Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar-190 025, Jammu and Kashmir, India. Email: drzubair7866@gmail.com

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RESULTS AND DISCUSSION

A total of 44 samples (30 from mastitic milk, 8 from respiratory infections and 6 from urinary infections in cattle) were processed and subjected to AST. The results of *in-vitro* chemotherapeutic sensitivity of samples against 6 antibiotics revealed the following results (Table 1-3).

Out of 30 milk samples tested 73.34 per cent (22/30) were found to be sensitive to gentamicin, 60 per cent (18/30) sensitive to tetracycline, 46.67 per cent (14/30) sensitive to enrofloxacin, 36.67 per cent (11/30) sensitive to ceftriaxone and streptomycin while 6.67 percent were found to be sensitive to pencillin (Table 4).

Table 1: Milk samples. n= 30

Antibiotic	Sensitive	Intermediate	Resistant
Gentamicin	22	8	0
Enrofloxacin	14	11	5
Ceftriaxone	11	17	2
Pencillin	2	11	17
Tetracycline	18	12	0
Streptomycin	11	18	1

Table 2: Respiratory samples. n= 8

Antibiotic	Sensitive	Intermediate	Resistant
Gentamicin	8	0	0
Enrofloxacin	5	0	3
Ceftriaxone	5	2	1
Pencillin	0	0	8
Tetracycline	6	0	2
Streptomycin	6	0	2

Table 3: Urinary samples. n= 6

Antibiotic	Sensitive	Intermediate	Resistant
Gentamicin	6	0	0
Enrofloxacin	4	0	2
Ceftriaxone	2	3	1
Pencillin	0	1	5
Tetracycline	4	0	2
Streptomycin	4	1	1

Table 4: Milk samples. n= 30

Antibiotic	Sensitivity percentage
Gentamicin	73.34%
Tetracycline	60.00%
Enrofloxacin	46.67%
Ceftriaxone	36.67%
Streptomycin	36.67%
Pencillin	6.67%

Table 5: Respiratory samples. n= 8.

Antibiotic	Sensitivity percentage
Gentamicin	100.00%
Tetracycline	75.00%
Enrofloxacin	62.50%
Ceftriaxone	62.50%
Streptomycin	75.00%
Pencillin	0.00%

Table 6: Urinary samples. n= 6.

Antibiotic	Sensitivity percentage
Gentamicin	100.00%
Tetracycline	66.67%
Enrofloxacin	66.67%
Ceftriaxone	33.34%
Streptomycin	66.67%
Pencillin	0.00%

The analysis of respiratory samples revealed the following results: Out of 8 samples, 100 per cent (8/8) samples were sensitive to gentamicin, 75 per cent (6/8) sensitivity was recorded for tetracycline and streptomycin, 62.5 per cent (5/8) sensitivity was recorded for enrofloxacin and ceftriaxone while there was complete resistance to pencillin (Table 5).

The *in-vitro* sensitivity of 6 urinary samples revealed that 100 per cent (6/6) samples were sensitive to gentamicin, 66.67 per cent (4/6) sensitive to enrofloxacin, tetracycline and streptomycin, 33.34 per cent (2/6) sensitive to ceftriaxone while there was complete resistance observed to pencillin (Table 6).

The results of *in-vitro* drug sensitivity from the clinical samples showed 100 per cent efficacy in case of respiratory and urinary infections whereas 73.34 per cent efficacy in case of bovine mastitis to the gentamicin drug. Pencillin was found to be the most resistant drug against the above commonly encountered infections in cattle. Bhaumik, (1997) in his study on *in-vitro* sensitivity on clinical mastitic samples reported similar results that there was no resistance to gentamicin. Gentamicin was found to be the drug of choice in clinical mastitis (Zahid, 2004). Verma *et al.* (2018) reported gentamicin to be highly efficacious (65.86%) in mastitis thus in agreement with our findings. Few workers found highest sensitivity of mastitic pathogens to gentamicin and enrofloxacin (Kumar and Sharma, 2002; Dhakal *et al.*, 2007) which support our findings. In the study conducted by Ahmed and Saeed (2020) gentamicin and streptomycin were found to be more effective against bovine mastitis in South Khartoum, which are more or less similar to our results. In his research conducted by Mubarack *et al.* (2012) similar results were reported for gentamicin against mastitis in Coimbatore, Tamil Nadu. Likewise 100% efficacy was reported by Lehtolainen *et al.* (2003) in bovine mastitis from Finland and Israel. The research on bovine clinical mastitis and AST pattern in Tripur district, Tamilnadu by Eswaran *et al.* (2018) also showed gentamicin and enrofloxacin to be highly sensitive. The *in-vitro* antibiogram of mastitic milk conducted by Iqbal *et al.* (2004) showed greater sensitivity of enrofloxacin, gentamicin while lesser sensitivity to pencillin which further corroborate our results. More or less similar results have been reported by Ranjan *et al.* (2010) in their study on drug sensitivity pattern in bovine mastitis.

With regard to respiratory samples, similar results for tetracycline and pencillin have been put forth by Marru *et al.*, (2013) in their study on ovine pneumonic pasteurellosis in Haramaya District Ethiopia.

The present findings of *in-vitro* sensitivity may be ascribed to changing resistance patterns of the bacterial pathogens and the broad spectrum of the drugs against both gram positive and gram negative bacteria.

CONCLUSION

Bacteria become resistant to routinely used antibiotics. Gentamicin is still found to be the most efficacious in

commonly seen infections in cattle of Kashmir Valley while the drug like pencillin has emerged to be resistant out of the studied antibiotics. Thus routine investigation and regular Antibiotic Sensitivity should be performed to decide the suitable drug against the encountered infection of cattle to limit the indiscriminate use of antibiotics to avoid and reduce the antibiotic resistance and the occurrence of antibiotic residues in foods like milk and meat.

Conflict of interest

All authors declare that they have no conflict of interest.

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