Trakia Journal of Sciences, Vol. 6, Suppl. 1, pp 147-151, 2008

Available online at:
http://www.uni-sz.bg

ISSN 1312-1723

SOME CLINICAL AND LABORATORY CHANGES IN DOGS AND CATS WITH SURGICAL AND INTERNAL DISEASES TREATED WITH ULTRASOL (20 % SULFAMETHOXYDIAZINE)

Ts. Tchaprazov [*], A. Russenov [**], Iv. Borissov [*], St. Vangelov

* Department of Veterinary Surgery, Faculty of Veterinary Medicine, Trakia University Stara Zagora 6000, Bulgaria
**Department of Internal Non-infectious Diseases and Clinical Toxicology, Faculty of Veterinary Medicine, Trakia University, Stara Zagora 6000, Bulgaria

ABSTRACT

Sulfamethoxydiazine, similarly to the other sulfanilamides, is indicated in inflammations caused by Gram negative and Gram positive bacteria.
During the study, the therapeutic effect of the dosage form was tested in 6 dogs and 6 cats. The dosage was conformed to the instructions of the manufacturer for i.m. route of administration in gluteal area. The treatment' duration was from 5 to 7 days.
In all patients, the clinical status and a number of haematological and blood biochemical parameters were determined prior to and after the end of the treatment.
On the basis of obtained results, it could be concluded that the preparation could be used for treatment of dogs and cats with wounds, dermatitis, otitis and other local or general infectious diseases, as well as of patient with respiratory, alimentary and urinary diseases.

Key words: Ultrasol, sulfamethoxydiazine, small animals, clinical relevance

INTRODUCTION

Sulfamethoxydiazine is used in both human and veterinary medicine as an antimicrobial drug (1, 2, 3, 4). Its antimicrobial spectrum includes a considerable number of microorganisms – Staphylococcus spp., Streptococcus spp., Klebsiella pneumoniae, Esherichia coli, Salmonella spp., Pseudomonas aeruginosa, Neisseria spp., Chlamydia, Pasteurella spp., etc. (5, 6).
The inhibiting effect of the drug upon microorganisms is due to its effect as competitor of p-aminobenzoic acid that is needed for microbial metabolism. Thus, the reproduction of microbial cells in inhibited because of the impossibility to synthesize folic and folinic acids and thus, nucleic acids and proteins.

Correspondence to: *Dr. Ts. Tchaprazov, Faculty of Veterinary Medicine, Trakia University, 6000 Stara Zagora, Bulgaria,*
***E-mail**: tz_chaprazov@yahoo.com*

Sulfamethoxydiazine, similarly to other sulfanilamides, is indicated in infected wounds and burns, inflammations of ears, meninges, staphylococcal infections of limbs, respiratory and genitourinary diseases (7, 8).
The aim of the present investigation was to survey the efficacy of sulfamethoxydiazine monotherapy in companion animals with various pathologies.

MATERIAL AND METHODS

The therapeutic effect of the preparation Ultrasol containing 20% sulfamethoxydiazine, produced by Richterpharma ad, Wels, Austria was monitored in 6 dogs and 6 cats with surgical and internal diseases, patients of the Small Animal Clinic of the Faculty of Veterinary Medicine, Trakia University – Stara Zagora.
The applied dose was according to manufacturer's instructions (initial dose of 200 mg/ 5 кg to 400 mg/ 5 кg; maintenance dose of 100 mg/ 5 кg to 200 mg/ 5 кg) administered intramuscularly in gluteal area.

The duration of application was from 5 to 7 days.

The surgical patients were three dogs with Dermatitis purulenta, Vulnus laceratum regio femoralis dextra and Prolapsus penis, and 3 cats with Otitis catarrhalis (Otitis externa eczematoza), FUS - status post uretrostomia and Vulnus laceratum regio glutealis dextra. Also, 3 dogs and 3 cats with non-infectious internal diseases have been treated: dogs with Glumerulonephritis acuta, Pneumonia catarrhalis acuta and Enteritis catarrhalis acuta; and cats with Gastroenteritis catarrhalis acuta, Enteritis catarrhalis acuta and Cystitis acuta.

In all treated animals, several clinical and blood laboratory parameters have been determined before the therapy and after its end: rectal body temperature (°C), heart rate (beats/min), respiratory rate (beats/min), erythrocyte counts (T/L), haemoglobin content (g/L), haematocrit (L/L), leukocyte counts (G/L), blood glucose (mmol/L), urea (mmol/L), ASAT (U/L), ALAT (U/L), total protein (g/L) and alkaline phosphatase (U/L) using routine methods of analysis.

RESULTS

Clinical and blood laboratory investigations on the therapeutic effect of Ultrasol in surgical patients

Table 1 presents the changes in studied parameters in dogs with surgical diseases, treated with Ultrasol.

Table 1. *Changes in the clinical and blood laboratory parameters in dogs with surgical diseases prior to and after monotherapy with the preparation Ultrasol, applied i.m. at 400 mg/ 5 kg b.w. (initial dose) and 200 mg/ 5 kg b.w. (maintenance dose).*

Patient species and ID	Patient No 1, dog		Patient No 2, dog		Patient No 3, dog	
Diagnosis	Dermatitis purulenta		Vulnus laceratum		Prolapsus penis	
Parameters	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Rectal body temperature (°C)	39.1	38.9	39.3	38.7	38.6	38.4
Heart rate (min^{-1})	116	100	120	106	103	106
Respiratory rate (min^{-1})	16	20	20	18	19	20
Erythrocytes (T/L)	6.12	5.40	5.48	5.2	5.46	5.54
Haemoglobin (g/L)	142	137	141	125	129	132
Haematocrit (L/L)	0.43	0.39	0.36	0.36	0.37	0.38
Leukocytes (G/L)	4.3	13.6	15.0	10	4.7	4.4
Blood glucose (mmol/L)	4.78	4.17	8.16	5.91	5.15	4.30
Urea (mmol/L)	2.5	6.78	4.19	4.8	7.22	5.0
ASAT (U/L)	9	8	18	7	42	27
ALAT (U/L)	51	24	12	5	17	67
Total protein (g/L)	60	68	74	52	60	66
Alkaline phosphatase (U/L)	156	166	250	182	91	99

In patient № 1 (dog) with Dermatitis purulenta, skin lesions were found to be limited after a 5-day treatment and no pustules were present. A favourable prognostic sign was the increased leukocyte counts: from 4.3 G/L to 13.6 G/L.

The dog № 2 with Vulnus laceratum regio femoralis dextra had initially exhibited considerably elevations in some of studied parameters. The alkaline phosphatase activity before the treatment was 250 U/L. After a 5-day course, it fell up to 182 U/L. A similar tendency was detected with regard to aminotransferases ASAT and ALAT.

The patient dog №3 with inflammation of mucous coats of the prepuce and the penis due to penis prolapse did not show significant changes in studied parameters prior to and following the therapy.

Table 2 presents the clinical and blood laboratory alterations in cats with surgical diseases, treated with Ultrasol.

In a cat Otitis catarrhalis (Otitis externa eczematoza) (patient № 4), the performed examinations also confirmed the success of the therapy. The heart and respiratory rates were lower (from 120 to 112 beats/min and from 24 to 22 beats/min, respectively), the erythrocytes and haemoglobin increased (from 4.28 to 5.86 T/L and from 119 to 140 g/L, respectively). The levels of ASAT, ALAT, urea and alkaline phosphatase were lower by the end of the treatment.

Table 2. *Changes in the clinical and blood laboratory parameters in cats with surgical diseases prior to and after monotherapy with the preparation Ultrasol, applied i.m. at 400 mg/ 5 kg b.w. (initial dose) and 200 mg/ 5 kg b.w. (maintenance dose).*

Patient species and ID	Patient No 4, cat		Patient No 5, cat		Patient No 6, cat	
Diagnosis	Otitis catarrhalis		FUS		Vulnus laceratum	
Parameters	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Rectal body temperature (°C)	38.1	38.3	37.6	38.1	38.9	38.5
Heart rate (min^{-1})	120	112	84	104	94	96
Respiratory rate (min^{-1})	24	22	12	16	20	20
Erythrocytes (T/L)	4.28	5.86	4.52	4.0	4.78	4.12
Haemoglobin (g/L)	119	140	101	94	115	98
Haematocrit (L/L)	0.34	0.42	0.29	0.24	0.33	0.25
Leukocytes (G/L)	8.5	6.0	19.0	21.0	10.4	4.6
Blood glucose (mmol/L)	6.98	6.88	4.55	4.34	4.6	4.29
Urea (mmol/L)	33	8.43	14.66	5.9	9.6	7.18
ASAT (U/L)	46	12	8	4	36	48
ALAT (U/L)	252	30	30	34	40	44
Total protein (g/L)	61	58	60	68	66	64
Alkaline phosphatase (U/L)	384	9	48	62	22	16

The cat with FUS – status post uretrostomia (patient № 5) the changes in investigated parameters were not consistent with the exception of blood urea levels that decreased from 14.66 mmol/L to 5.9 mmol/L after a 4-day application of Ultrasol.

Patient № 6 (cat with Vulnus laceratum regio glutealis dextra) was dismissed without signs of infection of the wound, and it's clinical and blood laboratory parameters were normal both before and after the 3-day treatment.

Clinical and blood laboratory investigations on the therapeutic effect of Ultrasol in patients with internal non-infectious diseases

Table 3 lists the clinical and blood laboratory examinations performed in dogs with internal non-infectious diseases, treated with the preparation Ultrasol.

Table 3. *Changes in the clinical and blood laboratory parameters in dogs with internal diseases prior to and after monotherapy with the preparation Ultrasol, applied i.m. at 400 mg/ 5 kg b.w. (initial dose) and 200 mg/ 5 kg b.w. (maintenance dose).*

Patient species and ID	Patient No 1, dog		Patient No 2, dog		Patient No 3, dog	
Diagnosis	Glumerulonephritis acuta		Enteritis catarrhalis acuta		Pneumonia catarrhalis acuta	
Parameters	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Rectal body temperature (°C)	39.3	38.5	37.8	38.1	40.2	38.8
Heart rate (min^{-1})	130	102	120	116	130	116
Respiratory rate (min^{-1})	20	18	14	17	40	22
Erythrocytes (T/L)	5.44	5.86	7.84	6.96	6.91	6.4
Haemoglobin (g/L)	130	134	170	156	197	178
Haematocrit (L/L)	0.37	0.38	0.51	0.45	0.48	0.43
Leukocytes (G/L)	19.9	11.8	20.9	7.2	26.0	13.7
Blood glucose (mmol/L)	3.73	4.81	4.68	2.41	3.4	2.6
Urea (mmol/L)	7.78	6.3	5.28	5.4	6.3	6.5
ASAT (U/L)	59	69	14.1	12	35	33
ALAT (U/L)	24	27	34	38	56	73
Total protein (g/L)	49	54	55	66	60	59
Alkaline phosphatase (U/L)	113	170	90	120	95	117

In the first dog patient with Glumerulonephritis acuta, ASAT activity increased from 59 U/L to 69 U/L (reference range 8.9 – 48.5 U/L) and also, alkaline phosphatase was elevated from 113 U/L to 170 U/L. After a 7-day therapy, the dog was cured.

The patient № 2 (dog with Enteritis

catarrhalis acuta) exhibited an insignificant decrease in body temperature - 37.8 °C, that, after the treatment returned to normal values (38.1 °C). The outcome of the 4-day treatment was healing of the patient accompanied with elevation of blood alkaline phosphatase from 90 до 120 U/L.

The third dog patient with Pneumonia catarrhalis acuta was not completely healed after a 10-day therapy despite the favourable effect on both clinical and blood laboratory parameters (body temperature decrease from 40.2 °C to 38.8 °C, respiratory rate: from 40 to 22 beats/min and leukocytes: from 26.0 G/L to 13.7 G/L).

Table 4 presents the results obtained in three cats with internal non-infectious diseases, treated with Ultrasol.

Table 4*. Changes in the clinical and blood laboratory parameters in cats with internal diseases prior to and after monotherapy with the preparation Ultrasol, applied i.m. at 400 mg/ 5 kg b.w. (initial dose) and 200 mg/ 5 kg b.w. (maintenance dose).*

Patient species and ID	Patient No 4, cat		Patient No 5, cat		Patient No 6, cat	
Diagnosis	Gastroenteritis catarrhalis acuta		Enteritis catarrhalis acuta		Cystitis acuta	
Parameters	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Rectal body temperature (°C)	39.9	38.6	39.5	38.8	38.9	39
Heart rate (min^{-1})	135	120	125	125	130	130
Respiratory rate (min^{-1})	30	26	25	23	28	26
Erythrocytes (T/L)	7.5	5.16	5.80	5.45	4.6	4.9
Haemoglobin (g/L)	159	125	140	107	90	113
Haematocrit (L/L)	0.43	0.35	0.40	0.31	0.26	0.30
Leukocytes (G/L)	15.7	8.6	15.0	10.2	10	9.4
Blood glucose (mmol/L)	6.74	3.51	5.92	5.89	3.14	4.89
Urea (mmol/L)	4.94	5.27	5.80	4.77	4.47	5.7
ASAT (U/L)	11	13	57	50	49	45
ALAT (U/L)	52	39	86	107	63	78
Total protein (g/L)	60	62	60	81	61	63
Alkaline phosphatase (U/L)	26	22	17	18	23	27

The cat with Gastroenteritis catarrhalis acuta (patient № 4) was referred with fever - 39.9 °C and respiratory rate of 30 beats/min (Table 4), and these parameters were normalized after a 5-day treatment.

The patient № 5 – a cat with Enteritis catarrhalis acuta and body temperature of 39.5 °C, ASAT – 57 U/L, was completely healed after i.m. administration of Ultrasol for 4 days.

The cat patient № 6 (Cystitis acuta) was initially wit slightly increased respiratory rates (28 beats/min) and blood ALAT levels (63 U/L), that were found to be within the normal range after a 7-day therapy.

DISCUSSION AND CONCLUSIONS

Sulfamethoxydiazine, similarly to other sulfonamides, acts by stimulation of cell division in very low doses, as a static in medium doses and exhibits a microbicide effect (9, 10). Ultrasol could ensure therapeutic concentrations after a single administration for 24 hours. The development of resistance occurs slowly, but steadily and could be transmitted by the next generations (11).

The clinical changes observed in all patients as well as the alterations in hematological and biochemical parameters demonstrated convincingly the good therapeutic effect of this chemotherapeutical drug. The data for the presence of severe liver damage after application of sulfamethoxydiazine (12, 13) were not confirmed in our studies, on the contrary, there were positive changes in the activities of liver transaminases.

The preparation Ultrasol could be successfully used for monotherapy of dogs and cats with various wounds, dermatites (14), otitis and other local and general surgical infections (9), in patients with respiratory, alimentary and genito-urinary systems (8), as well as for prevention of surgical infections in the post operative period.

REFERENCES

1. Chernoff, W. and Klein, S., Evaluation of a New Sulfonamide, sulfametin, in urinary tract infection. The J of New Drugs, 5:225-232, 1965.
2. Fast, M., Rosegger, H., Maver, H., Aspock, H. and Schuhmann, G., Unrecognized intrauterine toxoplasmosis despite screening. Pediatric Pathology, 19(1):93-97, 1984.
3. Mayer, M., Bilateral papilledema and retinochorioiditis ad papillam ihn 12 – year – old girl. Klin Monatsbl Augenheilkd, 204(4):252-253, 1994.
4. Mesarič, M. and Modic, T., Dilation and torsion of the caecum in a cow caused by a trichobezoar. Austr. Vet. J., 85(4):156, 2007.
5. Devine, L. and Hagerman, C. Spectra of Susceptibility of Neisseria meningitidis to Antimicrobial Agents In Vitro1. Applied Microbiol, 19(2):329-334, 1970.
6. Zani, F. and Vicini, P., Antimicrobial Activity of Some 1, 2-Benzisothiazoles Having a Benzenesulfonamide Moiety. Archiv der Pharmazie**,** 331(6):219–223, 1998.
7. Hughes, T. and Killmar, J., Efficacies of sulfonamides in prophylaxis for Pneumocytis cranii pneumonia. Antimicrobial Agents and Chemotherapy, Apr.: 962-965, 1996.
8. Chakov, Sh., Report, University of Forestry, Faculty of Veterinary Medicine, Sofia, 10. 01. 2002.
9. Bevill, F., Sulfonamides. Booth NM, MacDonald LE (eds), Veterinary Pharmacology and Therapeutics, 5th ed, The Iowa State University Press, Ames, Iowa, chapter 48, 1982.
10. Stowe, C., The sulfonamides. In Jones LM (ed), Veterinary Pharmacology and Therapeutics, Ames, Iowa, Iowa State University Press, chapter 33, 1995.
11. Nollet, N., Houf, K., Dewlf, J., Catry, B., De Zutter, L., DeKruif, A. and Maes, D., Variability in Antimicrobial Resistance among German Salmonella Enterica Strains from Fattening Pigs and Cows. Microbial Drug Resistance, 12(1):74–81, 2006.
12. 12. Horák, J., Mertl, L. and Hrabal, P., Severe liver injuries due to sulfamethoxazole-trimethoprim and sulfamethoxydiazine.Hepatogastroenterology, 31(5):199-200, 1984.
13. 13. Horák, J., Mertl, L. and Hrabal, P., Acute liver failure and severe cholestasis due to sulfonamides. Cas Lek Cesk, 124(6):185-187, 1985.
14. Fuchs, S. and Elsner, P., Sulfonamides in dermatology. Clinics in Dermatology; 21:7-11, 2003.