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Study of serum levels of cefquinome in goats by using microbiological assay method

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Abstract

For this study, 12 goats of either sex were selected. A group of six goats was administered with cefquinome @ 2 mg/kg by intramuscular route and another group of six goats was administered with cefquinome @ 2 mg/kg by intravenous route. The serum cefquinome concentrations in adult goats were determined up to 24 hrs after drug administration by using microbiological assay method. In the present study the therapeutic concentrations of cefquinome were maintained for more than 8 hours (0.08 ± 0.011 mcg/ml) after intravenous administration and intramuscular administration and at the time of 10th hr sampling the cefquinome was not detected in serum after either intramuscular or intravenous administration.

Keywords: Serum levels, cefquinome, goats, microbiological assay

Introduction

Cefquinome, an aminothiazolyl cephalosporin is a member of the 4th generation of cephalosporin's which have been developed solely for veterinary use [5, 10]. To decide the drug dose administration interval it is necessary to study the serum levels of cefquinome at different intervals of drug administration. Therefore the present study was planned to study the serum levels of cefquinome in goats by using microbiological assay method after intramuscular and intravenous administration of cefquinome.

Materials and Method

For this study, 12 goats of either sex were selected. A group of six goats was administered with cefquinome @ 2 mg/kg by intramuscular route and another group of six goats was administered with cefquinome @ 2 mg/kg by intravenous route. The serum cefquinome concentrations in adult goats were determined up to 24 hrs after drug administration by using microbiological assay technique using large glass plate [1, 2, 3]. The serum cefquinome levels data were analyzed by randomized block design and the significance was tested at 5% and 1% levels as per [7]. It is to state that the approval of Institutional Animal Ethics committee was approved for this research work.

Results and Discussion

The serum cefquinome concentrations in adult goats were determined up to 24 hrs after drug administration by using microbiological assay method. The assay sensitivity was found to be 0.05 mcg/ml. The mean serum cefquinome concentrations at different time intervals in goats after administration of single dose (2 mg/kg body weight) by intravenous and intramuscular routes are presented in Table no. 1 and 2 respectively.

The zero time serum concentration (C⁰p) of cefquinome in goats receiving it by intravenous route of administration was found to be 2.41 ± 0.40 mcg/ml and the serum cefquinome concentrations were detectable up to 8 hours (0.08 ± 0.011 mcg/ml) post administration. The maximum serum cefquinome concentration observed was 1.82 ± 0.317 mcg/ml at 0.0416 hrs (2.5 min) of sampling time. The MIC₉₀ of cefquinome for a range of microorganisms has been reported differently by various researchers from 0.024 to 1.563 mcg/ml for maximum number of bacteria.

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In the present study the therapeutic concentrations of cefquinome were maintained for more than 8 hours (0.08 ± 0.011 mcg/ml) after intravenous administration and at 10 hours the cefquinome concentration was not detected.

Table 1: Serum concentration of cefquinome at different time intervals after intravenous administration (2 mg/kg B.W.) in goats.

Time (in hrs)	Concentrations (mcg/ml) in Goat						Mean	SDTV	± S.E.
	G1	G2	G3	G4	G5	G6			
0	0	0	0	0	0	0	0	0	0
0.0416	1.45	2.45	0.71	2.35	1.30	2.65	1.82	0.777	0.317
0.0833	1.00	1.45	0.51	1.05	0.87	2.00	1.15	0.516	0.211
0.167	0.84	1.25	0.44	0.90	0.74	1.70	0.98	0.440	0.179
0.25	0.68	1.00	0.39	0.74	0.63	1.40	0.81	0.351	0.143
0.5	0.51	0.84	0.36	0.58	0.56	1.25	0.68	0.318	0.130
1.0	0.37	0.68	0.33	0.50	0.47	0.94	0.55	0.227	0.093
2.0	0.26	0.51	0.29	0.39	0.39	0.68	0.42	0.155	0.063
4.0	0.16	0.29	0.19	0.24	0.24	0.37	0.25	0.076	0.031
6.0	0.11	0.20	0.11	0.20	0.15	0.19	0.16	0.043	0.018
8.0	0.07	0.12	0.07	0.05	0.09	0.11	0.08	0.026	0.011
10.0	ND	ND	ND	ND	ND	ND	----	----	----

ND=not detected

Table 2: Serum concentration of cefquinome at different time intervals after intramuscular administration (2 mg/kg B.W.) in goats.

Time (in hrs)	Concentrations (mcg/ml) in Goat						Mean	SDTV	S.E.
	G1	G2	G3	G4	G5	G6			
0	0	0	0	0	0	0	0	0	0
0.25	1.65	1.40	1.50	1.05	0.94	1.45	1.33	0.276	0.113
0.50	1.95	1.85	1.80	1.45	1.60	1.95	1.77	0.202	0.082
0.75	1.75	1.60	1.65	1.65	1.85	1.55	1.68	0.108	0.044
1.00	1.45	1.30	1.30	1.30	1.40	0.84	1.27	0.218	0.089
1.50	1.05	0.90	0.96	0.98	1.10	0.66	0.94	0.155	0.063
2.00	0.56	0.73	0.71	0.74	0.80	0.48	0.67	0.124	0.051
4.00	0.38	0.46	0.44	0.42	0.48	0.28	0.41	0.073	0.030
6.00	0.22	0.26	0.26	0.26	0.28	0.17	0.24	0.040	0.016
8.00	0.13	0.14	0.14	0.14	0.14	0.11	0.13	0.013	0.005
10.0	ND	ND	ND	ND	ND	ND	--	--	---

ND=not detected

The peak serum concentration (C max) of cefquinome as shown in Table no. 2, was 1.77 ± 0.082 mcg/ml and it was observed at half an hour (T max) after administration of cefquinome by intramuscular route in goats. The cefquinome was detectable in serum up to 8 hours and the average concentration observed was 0.13 ± 0.005 mcg/ml. At the time of 10th hr sampling the cefquinome was not detected in serum after either intramuscular or intravenous administration.

In accordance with our results, [9] observed maximum concentration of 2.60 ± 0.14 mcg/ml at 0.5 hrs and could detected plasma cefquinome levels of about 0.06 mcg/ml at eight hours after intramuscular administration in sheep at the dose rate of 2 mg/kg. [8] reported the maximum concentration of 1.205 ± 0.078 mcg/ml at 2.174 ± 0.056 hrs in sheep could detect cefquinome up to 12 hours which is approximately 0.2 mcg/ml. [4] studied cefquinome pharmacokinetic in pigs after IM routes, for which they estimated the plasma cefquinome concentrations by microbiological assay and HPLC methods. They compared the pharmacokinetic parameters and observed that maximum concentration by microbiological method was 0.30 ± 0.16 mcg/ml and by LC/MC was 0.40 ± 0.15 mcg/ml respectively at 1.99 ± 0.82 and 2.33 ± 0.63 hours. They observed the cefquinome concentrations up to 0.03 by microbiological method and 0.04 by LC/MS.

Conclusion

It was concluded that the serum concentration of cefquinome was maintained upto 8 hours of intramuscular and intravenous administration of cefquinome in goats @ 2 mg/Kg body weight. At the time of 10th hr sampling the cefquinome was not detected in serum after either intramuscular or intravenous administration.

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