DISPERSION OF SULFAMOXOLE IN TISSUES OF POULTRY

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Summary : The blood levels and tissue dispersion of sulfamoxole in poultry has been investigated. The clinical importance and public health hazards on the basis of the results obtained has been discussed.

Key words : sulfamoxole systemic use dispersion antimicrobial public health hazard

INTRODUCTION

In the recent times, sulfamoxole has found its widespread systemic use in animal practice. The drug being one of the newly introduced sulfonamide with a wide range of antibacterial spectrum, its systemic use in poultry medicine is envisaged. Information on its pharmacokinetic parameters in poultry is not available. This study was thus undertaken to determine the blood levels of the drug after an oral therapeutic dose. The extent of the dispersion of the drug in different body tissues and organs of poultry has also been determined.

MATERIALS AND METHODS

Six healthy one year old hen weighing between 1.5 to 2.5 *kg* were used in each group. The birds before the experiment was started, were found free of any parasitic infestation and were maintained under a standard ration schedule.

Each hen of the two groups was given sulfamoxole (sulfuno(R)) orally in a dose of 275 *mg/kg* body weight. Samples of blood to be used as control was collected in tubes containing sodium oxalate before the administration of the drug. The experimental blood samples for determining drug levels were collected at 2 hr, 6 hr, 12 hr and 24 hr from the hen of group I and also at 48 hr from the hen of group II. The hen of group I and II were sacrificed at 24 hr and 48 hr respectively and tissue samples from different organs were collected. The concentration of free drug in the blood and organs was determined by Bratton and Marshall (2) colorimetric method.

RESULTS

The mean blood levels at 2 hr, 6 hr, 12 hr and 24 hr were 6.82 (±0.57), 4.05 (±0.27), 3.58(±0.40) and 1.13 (±0.20) *mg%* respectively. At 48 hr, the mean blood concentration was 0.28 (±0.02) *mg%*.

The tissue distribution of the drug is shown in Table I. The drug residual concentrati in the kidney, lung, liver, spleen and yolk were comparatively higher than those in the br and muscle. A mean concentration of 1.81 *mg%* was obtained in the kidney.

TABLE I : Mean concentration in *mg%* (±S.E.) of free Sulfamoxole (Sulfuno (R)) in tissues of poultry, sacrificed 24 and 48 hours post administration in a dose of 275 *mg/kg*.

Organs	24 *hours*		48 *hours*	
	No. of birds	*Mean concentration*	*No. of birds*	*Mean concentration*
Brain	(5)	0.27±0.06	(5)	0.17±0.05
Kidney	(5)	1.81±0.07	(5)	0.32±0.08
Lung	(5)	0.88±0.15	(5)	0.26±0.07
Liver	(5)	0.78±0.14	(5)	0.56±0.07
Spleen	(5)	1.57±0.20	(5)	0.28±0.03
Yolk	(5)	0.92±0.06	(5)	0.26±0.04
Muscle	(5)	0.55±0.09	—	—

DISCUSSION

Sulfamoxole concentration in the blood and tissues of poultry after single oral do administration have been studied. The two groups of birds were sacrificed at 24 hr and 48 h post administration of the drug. The highest blood concentration of 6.82 *mg%* obtained 2 hr declined with time showing a minimal 0.28 *mg%* at 48 hr. These observations showed th the drug could not attain an appreciable therapeutically active blood level at any time. Th was in contrast to the observation in relation to sulfaquinoxaline as reported by Banerjee *et a* (1). In general, a sulfonamide concentration ranging between 8 to 10 *mg%* is considered to b optimally antimicrobial (5). Thus sulfamoxole could not possibly be used in systemic infectio in poultry at the dose of 275 *mg/kg*.

The high concentration of the drug detected in the kidney at 24 hr was advantageous f use in urinary tract infection. The concentration obtained in the kidney with sulfamoxole w higher than was obtained with sulfaquinoxaline and sulfamezathine (1,3). However, there wa possibility of crystallization of the drug in the kidney. The high concentration of the drug i the kidney was expected since sulfamoxole was considered to have higher rate of urinary excretio At 48 hr, there was appreciable fall in the kidney drug residue whereas in the liver the amou retained was higher as compared to other organs. This apparently indicated that the rate biotransformation of sulfamoxole in the liver was probably slower. The rate of clearance the drug through the kidney, on the other hand, was higher since the concentration of 1.81 *mg* at 24 hr fell to 0.32 *mg%* at 48 hr.

Fair amount of the drug was detected in the yolk at 24 hr as well as at 48 hr showin that the drug residue may pass into the eggs as well. Sulfamoxole concentration in the yol was significantly higher than in the case with sulfaquinoxaline (1).

The drug concentration in the muscle of birds at 24 hr was appreciable.

These observations indicated that the sale of birds or eggs treated with sulfamoxole may pose public health hazards and should be prohibited for atleast 15 days after the last dose was given. This prohibition is necessary because of the fact that sulfonamides are reported to cause allergic menifestation in susceptible human beings. Such withdrawal in the case of sulfaquinoxaline for 7 days has been reported to have decreased drug residue in the tissues (4). Further, this precaution would restrict induction of bacterial cross resistence to sulfonamides because of the presence of subtherapeutic amounts of the drug in the tissues of poultry.

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