ORIGINAL ARTICLE

DETERMINATION OF RESIDUES OF SULPHONAMIDE IN EGGS AND LAYING HENS

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ABSTRACT

Eggs were collected from different areas of Faisalabad city. The quantity of sulphonamides was determined in yolk, white and whole egg and compared with the permissible limit 1µg/ml for sulphadimethoxine available in literature. In another experiment, a group of hens were kept at a poultry farm after medicating them with darvisal liquid to see if the residues of sulphonamide pass into the eggs of poultry. The period of existence of residues was noted.

Keywords: Sulphonamide, sulphadimethoxine, residues, poultry.

INTRODUCTION

Poultry industry has continued to play an important role to meet the shortage of animal protein through the provision of eggs and meat to the ever increasing population of Pakistan. Poultry products can be produced in relatively shorter time as compared to milk, beef, mutton and fish. The availability of animal protein has been reported to be 16.63g against the recommended requirement of 27.4g per capita per day. The consumption of eggs has been increased from 23.34 to 40.93 eggs per capita per year in Pakistan during 1995(poultry report, 1996). For the treatment and to increase the production of poultry products, a number of chemotherapeutic agents are used in poultry farms. Sulphonamides alone or in combination with other drugs are commonly used. They are derivatives of para aminobenzene sulfonamide with different substituents at both the nitrogen. Sulphamerazine, sulphathiazole, sulphaquinoxaline, sulphabromo methazine, sulphaguanidine and succinyl sulpha-thiazole are used for treatment of coccidiosis of chickens, pallorum disease, parathyroid infections, fowl typhoid, fowl cholera and infections coryza. Following the administration of sulphonamides, their residues or metabolites do pass at some level in edible products like eggs and meat of treated birds and may cause potential hazards. Food contamination with the residues of drugs may create health problems.

In view of potential health hazards associated with the consumption of food products contaminated with residues of drugs, the project was under taken to determine the withdrawal period of sulphonamide in egg laying hens and the quantity of sulphonamides in commercially available eggs.

MATERIAL AND METHODS

Three hens were kept at a poultry farm. They were given darvisal liquid (sulphaquinoxaline) at the recommended dosage of 3.15ml per liter of drinking water for three consecutive days. Three eggs were collected daily from the second day post treatment till 12^{th} day post treatment. Standard curve was prepared by the literature method (Nagaraja *et al*, 2002). The method is based on the formation of a red colored azo product by the diazotization of sulphonamide followed by a coupling reaction with resorcinol. Absorbance of the resulting red azo product is measured at 500 nm.

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The concentration of the drug was estimated in egg white and egg yolk separately.

In the second experiment, a total of one hundred eggs were collected from ten different areas of Faisalabad city. From each area ten eggs were taken at random from different shops.

RESULTS

The concentrations of sulphaquinoxaline in the egg white and egg yolk after medication are given in table 1. The mean concentrations of sulphonamide residues were 0.192mg 0.107mg and 0.268mg for whole egg, yolk and white respectively. The maximum amount of sulphonamide found per egg was 0.694mg or 15.8µg per ml and minimum amount was 0.04mg or 1.2µg in m1 which is much higher as compared to permissible limit of 1µg per ml of sulphadimethoxine (US FOOD & Drug Administration, 1984).

On the 2nd day after stopping medication the concentration of sulfonamide was 0.248mg in egg white are 0.094mg in egg yolk, decreased with passage of time and no sulphonamide were detected in egg white on 6th day after stopping medication and in egg yolk on the 7th day after stopping medication.

In the second experiment, out of 100 collected eggs from different areas of Faisalabad only 12 eggs were found to give positive test for sulphonamides. Out of these 12 eggs, the white of three eggs and yolk of 7 eggs gave positive test for sulphonamides while two eggs gave positive test for both yolk and white. The concentration and total amount of sulphonamide residues in the 12 samples are given in table 2.

DISCUSSION

A great number of reports on the residues of sulphonamide and other antibiotics in eggs are given in literature. Kondo *et al* (1993) detected Nicarbazin in 10% of the eggs obtained by feeding chickens with a diet contaminated with nicarbazin within the range of 0.07 to

Table 1: Concentration of sulphaquinoxaline in the egg white and egg yolk after medication.

Sr. No.	Time (days) Stopping after medication	Concentration (mg) Egg white	Concentration (mg) Egg yolk
1.	2	0.248	0.094
2.	3	0.180	0.046
3.	4	0.163	0.298
4.	5	0.122	0.015
5.	6	x	0.008
6.	7	x	x

x = No sulphonamide residues

Table 2: Sulphonamides residues found in marketed eggs.

White		Yolk		Total (White + Yolk)
Concentration (ug/ml)	Total amount (mg)	Concentration (ug/ml)	Total amount (mg)	mg/egg
14.78	0.348	7.34	0.088	0.436
x	x	29.058	0.377	0.377
x	x	5.01	0.08	0.08
5.84	0.166	x	x	0.166
6.93	0.187	x	x	0.187
x	x	6.43	0.09	0.09
x	x	6.34	0.079	0.079
x	x	4.18	0.077	0.077
x	x	5.01	0.04	0.04
x	x	5.01	0.065	0.065
6.93	0.018	x	x	0.018
20.04	0.621	5.945	0.073	0.694
Mean	0.268		0.107	0.192

x = No sulphonamide residues

Table 3: Comparisons of various sulfonamides treated species showing their withdrawal periods

Sr. No.	Drugs	Treated species	Withdrawal periods	References
1.	Rafonaid (Sulphadimethoxine + Oremetoprim)	i) Laying chickens ii) Turkey hens	7-14 days	Laurencot *et al* (1972)
2.	Sulphadimidine	Laying hens	10 days	Blom (1974)
3.	Sulphadimidine and sulphaquinoxaline	Broilers of different ages	72 hrs	Luders *et al* (1974)
4.	Sulphamethazine	Turkey poults	72 hrs – 14 days	Heath *et al* (1975)
5.	Sulphamethoxazole	Chickens	5 days	Oikawa *et al* (1977)
6.	Sulphadimidine	Hens	7 days	Stange (1977)
7.	Sulphaquinoxaline	Fowls	5-11 days	Gennaro *et al* (1980)
8.	Sulphadiazine and sulphadimidine	Cocks	16-32 hrs	Hashem *et al* (1980)
9.	Sulphadimethoxine	Horse	14.13hrs half life	Li *et al* (1982)
10.	Sulphamerazine	Cattle and sheep	8 days	Schultz *et al* (1982)
11.	Sulphaquinoxaline	Rabbits	12.7 hrs half life	Eppel *et al* (1984)
12.	Sulphadimidine, Sulfanilamide and Sulphaquinoxaline	Laying hens	10 days	Nawaz (1985)
13.	Sulphaquinoxaline, apramycin, Sulfadimidine, sulphamerazine and sulfamethoxazole	Laying hens	6-10 days	Romvary *et al* (1988)
14.	Sulphachloropyrazine	Laying hens and broiler	12-17 days	Maqbool (1980)
15.	Sulphaquinoxaline	Layers and broilers	11-15 days	Rana *et al* (1993)

1.39 mg/g. Kennedy *et al* (1996) observed lasalocid residues in an egg sample from each of 161 eggs in Northern Ireland. Approximately 66% of the eggs contained lasalocid residues at concentration in excess of 3mg/g Discrens *et al* (1991) reported that more of the 20 samples of fresh, dried and frozen eggs from various European suppliers contained sulphonamides. It becomes essential to safeguard against the residues by monitoring or establishing withdrawal periods for therapeutic agents in edible products Romvary and Simon (1992) suggested that complete elimination of sulphonamides requires at least 5.2–7.4 days. Nawaz *et al* (1996) established a withdrawal period of 3 days post treatment for eggs of hens medicated with sulphadimethoxine. The withdrawal period of various species treated with different sulfonamides are given in table 3.

James Jacob Sasanyc *et al*. (2005) found 98.3% of egg samples in Kampala district having detectable sulphonamide residues. The Canadian Food Inspection Agency (FIA) analyzed that 99% of the egg samples screened were found to be free of any veterinary drug residue. The remainders were found to contain tetracylines sulphonamides, ciprofloxacin, macrolides, and streptomycin (Quon, 2005).

CONCLUSIONS

From the above studies it can be concluded that the eggs should be marketed only after a withdrawal period of 3 – 11 days post treatment depending upon the nature and dose of sulphonamides.

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