Pesticide Levels of Patients on Chronic Hemodialysis

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INTRODUCTION

This communication reports a statistical comparison of the plasma levels of three pesticides pp-DDT, pp-DDE and Pentachlorophenol (PCP) on a control group of individuals and patients undergoing chronic hemodialysis (Charity Hospital at New Orleans, Louisiana). The levels of pesticides in a normal population have been established. Individuals undergoing chronic hemodialysis present a unique population and it was felt that their organ chlorine pesticide burden might be altered. Small molecules are capable of traversing the dialysis membrane in both directions. The presence of low molecular weight constituents in the water used for dialysate fluid may be critical since the dialysis patient is exposed to substantially greater amounts of water than normal individuals. If these trace substances pass through the dialysis membrane and become trapped by binding mechanisms, sequestration by inaccessible body compartments or by their solubility characteristics, high and potentially toxic levels of these substances could accumulate. Additionally, the lack of kidney function may alter the rate of metabolism and excretion or organic chloride pesticides in the chronic renal failure patient.

METHODS

Blood samples were drawn from controls and patients undergoing hemodialysis for chronic renal failure. Samples were drawn before dialysis was started and at the end of a six-hour dialysis period. Controls were either relatives of patients in the dialysis unit or workers at the unit. Plasma samples were immediately frozen and air-shipped to a pesticide laboratory in Hawaii for analysis.

PCP was determined using the methods of Rivers (1972) which involved a benzene extraction followed by methylation of the PCP with diazomethane. For analysis of DDT and DDE, 2 ml of plasma and 6 ml of hexane were mixed in a screw-cap culture tube for two hours on a wrist action shaker. Five ml of the hexane were removed and evaporated to 0.5 ml of which 2-8 µl were injected into a Varian Aerograph Model 204 gas chromatograph equipped with a tritium foil electron-capture detector. A 4% SE-30/6% QF-1 (on Chromosorb W 80/100, High Performance) column was used for quanti-

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tation and a 1.5% OV-17/1.95% QF-1 (on Supelcoport 80/100) column was used for confirmation. Temperatures of 195, 205, and 210°C were used for column, detector, and injector, respectively.

RESULTS

The plasma levels of the three pesticides were statistically the same for all three groups, See Table 1 and 2. The hypothesis that DDE, DDT, and PCP are the same under the conditions pre, post and control were tested by multiple=variant analysis of variance level the hypothesis could not be rejected.

TABLE 1

Pesticides in µg/l or ppb

Conditions	N	pp-DDE	pp-DDT	PCP
Predialysis AV	23	11.86	3.86	15.86
Postdialysis AV	23	10.91	3.21	15.69
Control AV	14	13.28	3.21	15.00

TABLE 2

Correlation Coefficients - N=60

	pp-DDE	pp-DDT
pp-DDE	-----	0.757282 0.0001
pp-DDT	0.757282 0.0001	-------
PCP	-0.195870 0.1298	-0.179019 0.1677

DISCUSSION

This type of data suggest that the body burden of pesticides which are both lipid soluble and protein bound (Schoor, 1973) are not dependent on renal function for either of the three individual excretions or the ratio of pp-DDE to pp-DDT. The ratios were the same for both groups and were similar to those observed in a general population study (Radomski et al., 1971).

Lawton et al. (1971) have reported lower levels of DDT in patients on chronic hemodialysis. This discrepancy could be accounted for by dietary restriction imposed on the patients in their experimental group.

REFERENCES

LAWTON, R.L., JOHNSON, L.G., and MORRIS, R.L.: Indus. Med. 40:22-24 (1971).

RADOMSKI, V.L., DEICHMANN, W.B., REY, A.A. and MERKIN, T.: Toxicol. Appl. Pharmacol. 20: 175-185 (1971).

RIVERS, J.E.: Bull. Environ. Cont. Toxicol. 8(5):294-296 (1972).

SCHOOR, W.P.: Bull. Environ. Cont. Toxicol. 9(2):37 (1973).