

CHOLINESTERASE AND PARAOXONASE (PON1) PATTERNS IN ORGANOPHOSPHATE PESTICIDE POISONING

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Organophosphate (OP) based pesticides are widely used and have emerged as the major contributor to ill health associated with pesticides. Because of their ready availability, these compounds are commonly consumed for the purpose of suicide. OP-poisoning cases showed variable recovery-response to the treatment. A number of lines of evidence suggest protection against OPs by serum paraoxonase (PON1).

Present study was undertaken to evaluate the patterns of plasma cholinesterase (PChE) and RBC cholinesterase (Ery-AChE) and total serum PON1 activity among the OP-poisoning cases. Distribution of total plasma PON1 activity among the normal individuals was also studied. 34 out of 91 cases of OP-poisoning received during April '03 to March'04 were included in the study ranging from 5-60 years of age. Blood samples of these individuals were analyzed for activities of PChE by modified Ellman's method; Ery-AChE by modified Szinicz's method and total PON1 from plasma by a modified spectrophotometric method of Eckerson. OP-poisoning cases showed significant

depression in PChE levels (Table-1). There was variable response in the recovery pattern of the monocrotophos and chlorpyriphos poisoning cases as judged by the recovery of PChE activity. In monocrotophos poisoning, the recovery started from the first day itself while in the chlorpyriphos poisoning cases, a typical pattern was observed i.e. PChE levels initially decreased upto about a week and then followed by the recovery in the enzyme activity. This might be due to the formation of chlorpyriphos-oxon during the first week, which is known to be more toxic than the parent compound. There was a significant depression in Ery-AChE activity among the OP-poisoning cases (Table-1). The activity of PON1 was depressed significantly in the OP-poisoning cases. Total PON1 activity showed tri-modal distribution both in the controls as well as OP-poisoning cases (Fig.1). The samples of control subjects (Control-II) of farm-workers from Rupal village, a village about 14 km from Gandhinagar, were also analyzed to study the distribution of PON1 activity among these individuals. The activity of plasma PON1 among these individuals was found to be 215.99 ± 9.72 Units/L (mean \pm SE) and showed tri-modal distribution (Fig.2) similar to the observation made the northwest Indians. Tentative assignment of the individuals to three possible phenotypes: AA, AB and BB based upon the PON1 activity at the antimodes (200 and 400 U/L) could be made. Greater number of individuals (59.38%) belonged to AA-phenotype i.e. low activity group (Table-2).

Table-1: Effect of Organo-phosphate pesticide poisoning on Plasma and RBC- cholinesterase activity.

Group	Control Subjects	OP Poisoning Cases	Percent Inhibition in PChE activity
Plasma cholinesterase (PChE) Units/L	3948 ± 112 (45)	1963 ± 121 * (34)	50.28
RBC- cholinesterase (Ery-AChE) Units/g Hb	32.71 ± 1.33 (15)	14.17 ± 2.20* (10)	56.68

*The figures in the parenthesis indicate the number of subjects
The values are Mean ±SE*

** P <0.001*

Table-2: Distribution of PON1 Phenotypes among Controls and OP-poisoning cases.

Group	No. of Individuals			Total
	Phenotype-AA	Phenotype-AB	Phenotype-BB	
Control-I	25 (58.1%)	17 (39.5%)	1 (2.4%)	43
Control-II	62 (52.1%)	52 (43.7%)	5 (4.2%)	119
OP Poisoning Cases	27 (90%)	3 (10%)	-	30
Total	114 (59.4%)	72 (37.5%)	6 (3.1%)	192

