

IDENTIFICATION OF ORGANOPHOSPHOROUS (OP) COMPOUNDS IN THE VOMITUS OF OP INTOXICATED PATIENTS & INVESTIGATION OF ORGAN SPECIFIC BIOCHEMICAL CHANGES FOLLOWING ACUTE OP POISONING

S. R. WIJERATHNA, S. B. P. ATHAUDA, P.A. J. PERERA AND N. SENANAYAKE*

*Department of Biochemistry and *Department of Medicine,
Faculty of Medicine, University of Peradeniya*

Pesticide poisoning is a major public health problem in developing agricultural countries. In Sri Lanka, Organophosphorous (OP) intoxication ranks highest among pesticides causing human intoxication. Diagnosis and treatment of OP intoxication is primarily based upon the signs and symptoms whereas routine laboratory investigations are non-diagnostic. Identification of the OP compound ingested is essential for definitive diagnosis, prompt initiation of treatment and predicting the possible complications like the intermediate syndrome.

In order to evaluate OP poisoning effectively, a simple, rapid and sensitive method is required. Gas chromatographic method was used to identify the type of OP compound ingested using gastric vomitus. It requires a liquid-liquid extraction procedure and a gas chromatograph (GC) with a nitrogen phosphorous detector (NPD) and a pesticide specific capillary column. Target organ damage was evaluated using organ/tissue specific markers in the serum/blood of OP intoxicated patients. Activities of red cell cholinesterase, serum cholinesterase, creatine kinase CK (Total), CK-MB, aspartate aminotransferase, alanine aminotransferase and the level of serum creatinine were used as organ/tissue specific markers. These parameters were determined using spectrophotometric methods.

Vomitus of suspected OP intoxicated patients was collected during gastric lavage and stored at -34°C . Blood samples were collected from every patient on the day of admission and subsequently, every other day, up to five days. Immediately after collection of blood, serum was separated and stored at -34°C . Then 0.001 ml of each working solution, prepared from stock solutions, was injected separately into the GC / NPD system & analyzed using a temperature gradient from 150°C to 280°C , simultaneously. Retention times (RTs) for various OP compounds were determined using CR7Ae chromatopac. Volume of 0.4 ml of vomitus was mixed with 0.4 ml of toluene in 1.5 ml tubes and vortexed thoroughly for 2 minutes and centrifuged at 14000 rpm for 2 minutes at 4°C . The supernatant was carefully removed into separate tubes and re-centrifuged. Then 0.001ml of each extract prepared from gastric vomitus was injected into the above GC / NPD system under the same conditions and the RTs were determined.

RTs for available OP compounds were determined. Majority of OP intoxications was due to chlorpyrifos and dimethoate. Some suspected cases treated as OP poisoning were really intoxicated by different agents. Red cell cholinesterase and the serum cholinesterase levels were depressed even after 5th day of hospitalization. Serum CK (Total) activity was found to increase upto the time of discharge and this is due to skeletal muscle damage as per deductions from enzyme analysis.