ABSTRACT

INTRODUCTION:
Organophosphorus poisoning is one of the most common methods of suicide in India. These compounds acts by inhibiting acetyl choline esterase enzyme which is present in our body and measuring the level of the enzyme will help us to determine the clinical outcome of the poisoning. Though RBC Acetyl choline esterase levels correlate well with clinical outcome due to technical reasons and lack of availability of rapid methods in our country, we were not measuring red blood cell enzyme levels. In Germany red blood cell esterase detecting machines have been developed for occupational setting and military exposures. From various validation studies it has been proven that this machine is reliable. This machine has not been validated for mega dose OP poisoning due to deliberate self-harm. Given the scale of pesticide poisoning in India and the lack of BChE measurement in most hospitals, this machine has potential for wide use in diagnosing OP poisoning, assessing severity of poisoning and predicting the clinical outcome.

AIM:
To validate RBC AChE Rapid Check mobile in detection of RBC AChE in patients with acute OP poisoning and determine its role in predicting clinical outcomes.

OBJECTIVES:
1. To validate RBC AChE check mobile for rapid detection of RBC AChE in patients of acute OP poisoning.
2. To determine admission levels of RBC AChE and blood BuChE and their correlation to severity of OP poisoning, cholinergic crises, need for mechanical ventilation and development of intermediate syndrome in patients of acute OP poisoning.
3. To determine the temporal profile of RBC AChE and blood BuChE and their correlation to duration of mechanical ventilation, duration of intermediate syndrome and of hospitalization in patients of acute OP poisoning.

DESIGN:
A prospective study with 2 parts 1. Validation study 2. Clinical cohort study
SETTING:
This study was conducted at the Christian medical College Vellore.

STUDY POPULATION:
Cases: Consecutive patients admitted to the emergency department or general medicine wards with a diagnosis of organophosphorus poisoning were recruited into the study till sample size of 59 was achieved after providing informed consent.

Controls for validation: 40 Normal controls (Hospital staff) and 10 Patients with non OP pesticide poisoning.

RESULTS:
Of the 59 Patients with OP poisoning most of them were in the younger age group, and the clinical profile of the poisoning patients were comparable with the studies from other parts of India. In our study we have found a very good correlation in measurement of AChE using the check mobile and standard laboratory method. (R2-0.868 and ICC of 0.86). For the measurement of BChE also there was good agreement between two methods and the correlation coefficient was 0.927. Diagnostic accuracy of admission machine AChE was determined and the levels of AChE of $\leq$ 25U/gm Hb had high specificity of 100% in differentiating OP poisoning from non OP pesticide poisoning and a sensitivity of 84.75% and a positive predictive value of 100%. In this study there was a reliable correlation between admission RBC AChE level and severity of poisoning (p=<0.001), need for ICU care (p=<0.001), mechanical ventilation (p=<0.001) and development of intermediate syndrome (p=0.021). We also found a level of $\leq$ 10 U/gm Hb has a significant predictive value for the development of intermediate syndrome, requirement of ICU stay and admission. Sequential enzyme measurement had no prognostic significance in clinical decision making.

CONCLUSION:
• In this study RBC AChE check mobile as point of care testing has been validated against standard laboratory method among patients with acute OP poisoning.

• This point of care testing can be reliably used to differentiate patients with OP poisoning from patients from non-OP pesticide poisoning.

• Severely inhibited RBC AChE levels in OP poisoning predicts need for ICU admission, mechanical ventilation and development of intermediate syndrome.

Key words-RBC AChE check mobile, Validation, Correlation coefficient, Diagnostic accuracy.