

**Original Research Article****Red Blood Cells Morphological Changes as a Prognostic Tool for Organophosphorus Toxicity Patients**

Authors

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Aims & Objectives- Identify and exclude the misinterpretation of peripheral blood smears examination. Identify organophosphorus induced RBC & WBC morphological changes used as a prognostic tool. Identify the organophosphorus induced peripheral blood cells changes.

Material & Methods: Blood was collected in a sterile EDTA containing tube and processed following our established laboratory protocol. A complete blood counting including HB%, PCV, Red cell indices, platelet count and total white cell count and differential was done by Automated blood cell counter with peripheral blood smear examination and further confirmed by manual oil immersion smear study method. Peripheral smears study was done with field A and B stain and leishman stain.

Conclusion- organophosphorus can cause changes on peripheral blood cell due to lipid peroxydation and oxidative stress of cell membrane. RBC shows various types changes theses may be used as a prognostic tool for severity of toxicity, monitoring of patients and follow-up and exclude the various misinterpretation of peripheral blood smear examination like hemolytic anemia and liver disease.

Keyword- Creanated RBC, Organophosphorus

MATERIAL & METHODS

Study area and design- The present study was conducted at the Department of Pathology Bhundelkhand Medical college associated Hospital Sagar, M.P. The study was designed as a observational hospital based study over a period of time from 2012 to 2015 years.

Ethical consideration- Blood was collected in a sterile EDTA containing tube and processed following our established laboratory protocol then generate the report of each patient. Take informed consent was obtained from all study participant for use of your blood sample for medical

research after doing physician request investigating and generate the report.

Patient's selection criteria- The study target all organophosphorus toxicity patients on the basis of clinical signs, symptoms history of exposure, history by attainder and smell with residual element on cloth of patients. We include both emergency and IPD patients with all age groups male and female both gender for study. Sample size is 50 patients.

Laboratory investigations Blood was collected in a sterile EDTA containing tube and processed following our established laboratory protocol. A

complete blood counting including HB%, PCV, Red cell indices, platelet count and total white cell count and differential was done by automated blood cell counter and peripheral blood smear examination. The all cell count indices including RBC, WBC count with differential along with morphological changes further confirmed by manual oil immersion smear study method. Peripheral smears study was done with field A and B stain and leishman stain.

COMPLETE BLOOD COUNT (CBC) AND PERIPHERAL SMEAR.

Materials

1. Purple vacutainer tube or capillary collector (EDTA) ethylenediaminetetraacetate
2. Slides and blue capillary tube
3. Needle or lancet
4. Vacutainer holder
5. Alcohol swab
6. Cotton balls
7. Absorbent materials
8. Slide case

Procedure

1. Specimen is collected into EDTA (purple) vacutainer. (5 or 7ml volume)

OBERVATION & DISCUSSION

Organophosphorus toxicity induced RBC changes.

RBC changes	Misinterpretation on peripheral blood smears examination	Total Cases (n=50)		Prognosis
		No.	%	
Acanthocytes, Spherocytes with central pallor, Polychromatophilic cells	RBC crenations , Heredity Sherocytosis, Hemolytic evidence	31	62.00 %	Mild toxicity
Dacrocytes / Boat sheped rbc, Shistocytes, Target cells	Hbsc Disease , Hemolytic Anemia Liver disease	10	20.00 %	Moderate Toxicity
Echinocytes / Burr cell Rouleaux formation	Ueaemia, High plasma protein concentration	05	10.00%	Mild Toxicity
Degenerated erythrocytes	Poor smear / store sample	04	8.00%	Sever Toxicity

Step 1. A small drop of venous blood is placed on a glass microscope slide, using a glass capillary pipette.

Step 2. A spreader slide is positioned at 45⁰ angle and slowly drawn toward the drop of blood.

Step 3. The spreader slide is brought in contact with the drop of blood and is being drawn away.

Step 4. The spreader slide is further pulled out, leaving a thin layer of blood behind.

Step 5. The blood smear is nearly complete.

Step 6. End result will be a glass slide with a well-formed blood film. After drying for about 10 minutes, the slide is fixed in methanol & stained with field A and B stain.

A well-made peripheral smear is thick at the frosted end and becomes progressively thinner toward the opposite end. The “zone of morphology” (area of optimal thickness for light microscopic examination) should be at least 2 cm in length. The smear should occupy the central area of the slide and be margin-free at the edges.

Hematological examination- Hematological examination including HB%, PCV, Red cell indices, platelet count and total white cell count with differential count should be done on peripheral smears stained with field A and B stains.

WBC changes

WBC cells	WBC Changes	% (n=50)
Neutrophils	Degeneration	14 28.00 %
Lymphocyte	Degeneration	11 22.00 %
Monocytes	Nuclear under goes disintegration.	04 8.00 %
Eosinophils	Degeneration	04%

Platelets

platelets	% (n=50)
Platelets aggregation (Pseudo thrombocytopenia)	02(2.00%)

CONCLUSION

In this study, we found that patients with more severe organophosphate poisoning shows degeneration of all peripheral blood cells due to lipid per oxidation and oxidative stress² of cell membrane and these have worst prognosis with very poor or delay recovery .Those patients shows various type RBC morphological changes^{3,4,5,13} on peripheral blood smear have mild to moderate type toxicity with slow recovery from illness. RBC shows various ^{6,10} types changes theses may be used as a prognostic tool^{3,2} for severity of toxicity ,monitoring of patients and follow-up and exclude the various misinterpretation of peripheral blood smear examination like hemolytic anemia and liver disease.RBC cell morphological changes also indicate to involvement of various other system CVS⁴, GIT⁵ and CNS³.etc

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