

Blood Picture in Cases of Lead Poisoning

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The peripheral blood picture was studied in two groups of lead workers arranging with varying levels of lead in blood, viz. below and above $70\mu\text{g}\%$. The mean hemoglobin values and the mean red cell counts were significantly low among the group with high blood lead. The mean white cell counts did not show a significant difference in the two groups.

Lead and its compounds were used by man a long time ago and it is still used in various industries. Hippocrates was the first to recognise the toxic properties of lead. Over the centuries that followed, intense literature was written about the toxic manifestations of lead. Lead colic, lead palsy and lead encephalopathy are the most common acute symptoms. Lead anemia is another condition that received much attention by industrial physicians. The study of leucocytes in case of plumbism, however, has received little attention.

Recently, it was found that in early stages of lead poisoning there is an increased rate of chromatide-type aberrations and one-break unstable chromosome changes in peripheral blood. The aim of this work was directed to study the blood picture in cases of lead poisoning.

Experimental

This study was performed on 55 workers in three factories using lead (storage battery factory, motorcar factory and printer-shop).

Samples of blood were taken by venipuncture. Estimation of lead was done using the

method of diphenylcarbazide (El-Shahat *et al.* 1978).

Hemoglobin was estimated using Sahli's method. Red cell and total white cell counts were done using the ordinary haemocytometer. A blood film was made, stained with Leishman stain to do a differential white cell count.

Results

The results obtained were summarised in Table 1. Workers were classified into two groups, *viz.* A and B. Group A included workers with blood lead values of less than $70\mu\text{g}/100\text{ml}$ blood and group B included those with higher values. The mean hemoglobin, mean red cell count, mean total and mean differential white cell counts are shown for both groups. The mean value \pm S.D. for both groups were statistically compared using the t-test; P values of less than 0.01 were considered significant.

It can be seen that the mean blood lead was higher in group B than in group A, whereas the mean hemoglobin is significantly high in group A ($P < 0.01$). On the other hand, mean differential cell counts are not significantly different in both groups.

Discussion

The level of lead in blood of $70\mu\text{g}/100\text{ml}$ blood is agreed upon as the upper limit of safe exposure (Zeilhuis 1969). Therefore, the workers were classified in two groups according to this level in this study. Group B showed significantly low hemoglobin levels than group A. This finding is in accordance with some other investigations (Johnstone and Hiller 1960 and Hunter 1975). However, anemia is a late sign of lead poisoning in industry (Albahary 1972).

The finding that the total and differential leucocytic counts were the same, both in the workers with low and those with high exposure, is in accordance with most studies cited in the literature (Johnstone and Hiller 1960).

Albahary (1972) reported relative increase of large lymphocytes and monocytes in the blood and he attributed this finding to a non-specific reaction of the reticuloendothelial system to lead poisoning. Pernis *et al.* (1964) failed to discover any abnormalities in leucocytes of guinea-pigs poisoned with lead. They concluded that the effect of lead is confined exclusively to the red cell series.

References

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Table 1. Statistical evaluation of the blood picture in two groups of workers exposed to lead poisoning

Determinations	Group A <70 μg Lead / 100 ml Blood Mean Value \pm S. D. n = 31	Group B >70 μg Lead / 100 ml Blood Mean Value \pm S. D. n = 24	t	p
Lead in Blood	42.10 \pm 20.5	104.2 \pm 17.2	11.760	<0.01
Hemoglobin	15.3 \pm 1.06	12.7 \pm 0.67	11.870	<0.01
RBCs	4.8 \pm 10.6	4.3 \pm 0.6	3.012	<0.01
WBCs	8.15 \pm 1.5	8.88 \pm 1.47	1.397	>0.05
Segmented	3.11 \pm 0.62	3.19 \pm 0.66	0.330	>0.05
Stab	2.08 \pm 0.76	2.20 \pm 0.86	0.033	>0.05
Lymphocytes	2.83 \pm 0.62	2.95 \pm 0.62	0.638	>0.05
Monocytes	0.68 \pm 0.16	0.91 \pm 0.70	0.620	>0.05
Basophyls	0.29 \pm 0.05	0.29 \pm 0.05	0.000	>0.05

* n = Number of observations

** \pm S.D = Standard deviation of the mean

صورة الدم في حالة التسمم بالرصاص

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أجريت دراسة تحليل الدم على مجموعتين من العمال العاملين في مصانع البطاريات والسيارات والمطابع التي تستخدم الرصاص ، على أساس متوسط نسبة الرصاص في الدم أقل أو أكثر من ٧٠ ميكروجرام٪ وقد وجد أن متوسط الهيموجلوبين وكرات الدم الحمراء ذو علاقة احصائية مميزة ، أما كرات الدم البيضاء فلا توجد لها علاقة احصائية مميزة في المجموعتين .