

LETTER TO THE EDITOR

EFFECT OF SUBLETHAL ELECTROCUTION ON SOME HAEMATOLOGICAL PARAMETERS IN *RATTUS NORVEGICUS*

Sir

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Whole body electrocution can cause many and quite different changes depending on a number of factors, notably the level and type of current, the carrier of electricity, the chain of external causes and the person affected (1). The effects of electric current on various tissues and on body metabolism have been studied extensively (2, 3, 4, 5). The effects of electric field on different cell membranes have been reported (6,7). Electric field induced hemolysis of rat and human erythrocytes has been observed under isotonic condition (8,9). In view of the dynamic nature, varied compositional heterogeneity and functional diversity of this liquid connective tissue, it was felt necessary to investigate on the effects of sublethal electrocution on some haematological parameters like total blood cell counts, PCV, CT, Hb. concentration and differential count in *Rattus norvegicus*.

Albino rats (34 nobs) 8-10 weeks old, weighing about 100 ± 10 gms, acclimated to the laboratory conditions ($28 \pm 2^\circ\text{C}$ & 55 RH), were divided into two groups. One group were subjected to electrocution as per the method described earlier (10) and the rats of other group were treated as controls. A sublethal A.C. stimulus of 100 V with a frequency of 100 C/S

was chosen and fixed for all experimental animals. The upper axial region was selected for contact of the 0.5 mm copper electrodes during electrocution. INCO, CSIO Research stimulator model MR was used for electrocution which was precalibrated with simpson multimeter (England). Each experimental animal was given a 2 second pulse. As a response the rats made a screeching noise and there was a tetanic contraction of the whole body. No mortality was observed during electrocution. Half an hour after electrocution the rats were anaesthetised by chloroform and immediately the blood was pulled by direct verticular puncture. The counting of total RBC, total WBC were carried out (11). The Hb estimation, measurement of PCV and CT were also done (11). The differential count was carried out by staining the blood film with Wright's stain and washed with buffered distilled water of pH 6.8.

There was a significant increase in RBC count ($P < 0.15$), total WBC count ($P < 0.001$), Hb conc. ($P < 0.001$), CT ($P < 0.001$) and PCV ($P < 0.01$) in electrocuted rats. A decrease in lymphocytes percentage ($P < 0.01$) and an increase in neutrophils percentage ($P < 0.01$) in electrocuted rats were also observed (Table I).

TABLE I

Sl. No	Parameters studied	Control ($\bar{X} \pm SEM$)	Electrocuted ($\bar{X} \pm SEM$)	Significance level
1.	Total RBC count ($\times 10,000/\text{mm}^3$)	578.16 \pm 17.75 (n = 17)	610.76 \pm 18.02 (n=17)	P < 0.15
2.	Total WBC Count/ (mm^3)	8,647.06 \pm 579.13 (n=17)	12,308.65 \pm 720.07 (n=17)	P < 0.001
3.	Hb concentration (gm %)	12.45 \pm 0.30 (n=17)	14.28 \pm 0.30 (n=17)	P < 0.001
4.	Clotting Time (in sec)	65.72 \pm 2.10 (n=11)	80.8 \pm 3.14 (n=15)	P < 0.001
5.	Haematocrit ratio (in %)	43.99 \pm 1.21 (n=11)	50.93 \pm 1.84 (n=15)	P < 0.01
6.	Blood differential count (in %)	(n=11)	(n=15)	
	(i) Lymphocytes	71.18 \pm 1.06	65.46 \pm 1.51	P < 0.01
	(ii) Neutrophils	16.36 \pm 0.77	22.33 \pm 1.26	P < 0.01
	(iii) Monocytes	6.54 \pm 0.45	5.33 \pm 0.48	NS
	(iv) Eosinophils	4.72 \pm 0.54	5.40 \pm 0.47	NS
	(v) Basophils	1.18 \pm 0.27	1.26 \pm 0.31	NS

NS refers to not significant

A slight increase in total RBC count was observed following electrocution. This increase can be accounted by possible mechanism such as increase in production and release of renal erythropoitin which stimulates the bone marrow and spleen to release more erythrocytes. Miller (12) has reported such condition in high altitude stress.

A significant increase of the Hb concentration in experimental rats may be due to the increase in RBC count. An increase in haematocrit ratio following different types of stress have been reported (13, 14, 15). In our experiment an significant increase (P < 0.01) in PCV value was observed. Electrocution induced immediate release of stored matured RBC from the spleen is one of the possibilities.

A decrease in Plasma Ca^{++} level may be one of the reasons for prolonging the clotting time in the experimental animals (10).

Stress induced changes in the total leucocyte count and differential count in mammals have been reported (16, 17). In the present study, the neutrophils were more in the electrocuted ones than in the controls. The eosinophils have shown an increase of one percent, but is statistically not significant. It may be possible that granulocytes are released from the bone marrow as a result of stress induced by stimulation and is mediated by corticosteroids, a stress hormone (18). The lymphocytes which constitute the dominant leucocyte type in rats appear to decrease in the experimental animals. The relative decrease in % of lymphocyte count may be due to the action of

the cortisol like steroids which are released into the blood stream following electrocution (19).

Thus the present study gives some positive

indications of disturbances in the haematological parameters in electrocuted animals. But further follow up experiments are needed to know the basic mechanisms responsible for such changes.

A. MITRA* AND B. P. DASH
*School of Life Sciences,
 Sambalpur University,
 Jyotivihar, Burla - 768 019 (Orissa)*

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*Corresponding Author