LETTER TO THE EDITOR

EFFECT OF THE SCORPION, *HETEROMETRUS FULVIPES* VENOM ON Mg^{2+} ATPase ACTIVITY IN THE MOUSE, *MUS BOODUGA*

Sir,

(Recieved on August 31, 1982)

The crude and heated venom of *Heterometrus fulvipes*, decreased SDH and Mg^{2+} ATPase activities of cockroach (8,11). The crude and dialyzed venom of *Leiurus quinquestriates* caused inhibition in catalase activity of human erythrocytes (7). In the present investigation the effects of crude, heated and dialyzed venoms of *H. fulvipes* on the Mg^{2+} ATPase activity of the mouse, *Mus booduga* were studied.

After collection of scorpion venom (1), heat denatured venom was prepared by boiling the venom in water bath (100°C) for 5 min. Dialysis of the venom was done in cellulose dialysis tubing seamless against distilled water for 24 hr at 5°C. The LD_{50} was calculated to be 28.2 $\mu gms g^{-1}$(2). One third of LD_{50} was designated as sublethal dose. The protein content (4) was taken as the criterion to express the actions of the venom (12). Sublethal doses of venom (9.4 $\mu gms g^{-1}$) was injected intramuscularly into the thigh muscle of hind leg of male mice (10±1 *gms*) and then they were sacrificed after 2, 6, 12, 24, 48 and 72 h. The Mg^{2+} ATPase activity of tissues viz. muscle from venom injected leg (EM), contralateral leg muscle (CM), brain and liver was determined (9) by estimating the inorganic phosphate liberated (3). The reaction mixture contained, 0.5 *ml* of tris buffer (0.13 M; pH 7.4) with 4 μ*moles* of substrate (ATP disodium salt), 0.5 *ml* of $MgCl_2$ (0.05 M) and 0.1 *ml* of homogenate (source of ATPase). Statistical analysis of data was done following the methods of Pillai and Sinha (6).

The crude, heated and dialyzed venom of *H. fulvipes* (2 h after injection) produced an initial rise in Mg^{2+} ATPase activity in the tissues of *Mus booduga* which was followed by a gradual inhibition reaching the maximum by 24 h after the injection of venom (Table I). The degree of elevation and inhibition in ATPase activity of the tissues was in the order of dialyzed venom>crude venom>heated venom. ATPase reached control levels by 72 h after injection of venom. However, the recovery was early with heated venom and slow with dialyzed venom. The rise in enzyme level in this study would be due to

TABLE I : Effect of scorpion venom on Mg^{2+} ATPase activity in mouse.

Tissue	*Control*	*Sample injected*	*Post-treatment effects (hours)*					
			2	6	12	24	48	72
Brain	111.63 ±10.5	C.V.	119.42* ±10.2	91.69 ±10.4	86.18 ±12.5	75.41 ±4.9	86.32 ±6.3	102.36* ±19.6
		H.V.	117.31* ±11.2	98.72 ±8.1	93.45 ±10.2	79.24 ±7.1	95.11 ±12.2	108.61* ±9.8
		D.V.	127.15 ±9.3	82.41 ±11.6	72.50 ±10.2	66.24 ±9.1	81.90 ±5.7	96.14* ±10.1
Experimental Muscle	208.43 ±26.2	C.V.	238.04 ±9.6	165.39 ±5.5	138.08 ±19.2	133.31 ±6.9	163.37 ±11.1	167.80 ±17.6
		H.V.	217.11 ±23.4	169.04 ±18.2	141.54 ±17.9	139.72 ±15.1	172.44 ±19.1	170.68 ±14.2
		D.V.	251.67 ±22.1	144.67 ±17.5	125.36 ±14.1	119.76 ±19.1	136.12 ±11.2	185.44* ±10.9
Contralateral Muscle	208.43 ±26.2	C.V.	234.65 ±16.2	185.63 ±18.7	152.19 ±12.7	145.30 ±5.6	197.32* ±12.1	213.01 ±29.1
	—	H.V.	219.92 ±19.0	191.68* ±14.6	167.33 ±17.1	147.08 ±18.2	201.99* ±12.4	194.21* ±16.1
	—	D.V.	249.11 ±19.4	167.14 ±12.1	139.44 ±20.8	132.15 ±17.4	186.04 ±9.2	188.75* ±15.1
Liver	124.18 ±9.3	C.V.	144.10 ±16.6	98.04 ±18.7	67.50 ±7.4	89.94 ±4.5	101.25 ±10.5	109.81 ±19.6
	—	H.V.	131.67 ±15.4	105.92 ±5.7	73.15 ±7.6	92.27 ±11.9	108.22 ±11.1	104.15 ±13.3
	—	D.V.	155.29 ±17.3	79.85 ±18.2	60.92 ±7.4	67.44 ±9.1	98.11 ±8.2	101.99 ±12.3

C.V. – Crude venom; D.V. – Dialyzed venom; H.V. – Heated venom.
All results are expressed as μ moles of Pi/*mg* protein/hr (mean±S.D. based upon six observations and for each observation, tissues from two animals were pooled). All values are significant ($P<0.001$) except*.

shock effects of the venom. Similar action of the crude and heated venoms of *H. fulvipes* was also reported in cockroaches (11), probably acting on energy producing systems (1) leading to decreased energy metabolism. The effect of heat treated venoms on mitochondrial morphology and electron transport system was considered to be due to phos-

pholipase A_2 which is relatively thermostable (10) and present in scorpion venom (5). The lesser inhibition of ATPase in the heated venom might be due to the presence of phospholipase A_2 and denaturing of some of the toxic proteins during heating. The increased toxicity of dialyzed scorpion venom (in the process eliminating most of the metals) has been by maximum inhibition in Mg^{2+} ATPase activity.

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