

PRELIMINARY STUDY OF THE INTENSE SYMPATHETIC DISCHARGE INDUCED CENTRALLY AFTER LATERAL VENTRICULAR ADMINISTRATION OF WHOLE VENOM OF *DENDROASPIS POLYLEPIS*

D.B. KYEGOMBE, D. NJOROGE, J. WANGAI AND B.V. TELANG

*Division of Pharmacology and Therapeutics, Department of Medicine,
P.O. Box 30588, Nairobi, Kenya*

Summary: Lateral ventricular administration of 100 μ g of *Dendroaspis polylepis* venom in cats consistently produced a marked rise in arterial blood pressure, heart rate, dilatation of pupils and piloerection. This intense central sympathetic discharge occurred after a latent period of 11.7 ± 0.72 min. Bilateral adrenalectomy abolished the sympathetic discharge showing that central release of catecholamines from the adrenal medulla may play an important role in eliciting the cardiovascular response.

Key words: *Dendroaspis polylepis* central sympathetic discharge adrenal glands

It has been reported (4) that injection of 10 mg of the venom of *Naja naja* or *Lachesis alternatus* into the subarachnoid space in dogs produced a rapid rise in blood pressure, slowing of pulse and arrest of respiration. This paper is a preliminary communication on the effect of whole venom of *Dendroaspis polylepis* on blood pressure and heart rate when administered intraventricularly in cats.

MATERIALS AND METHODS

The experiments were carried out on cats either sex weighing between 2.5-4.0 kg, the anaesthesia used was ether followed by chloralose (80 mg/kg) intravenously. The blood pressure was recorded from the left common carotid artery by a Statham transducer (P23D) and the heart rate on a Grass polygraph (Model 79-8P-40). The cats were kept on artificial respiration throughout the experiments using an electronic ventilator (Scientific and Research Instruments, London) at an air pressure of 15 cm of water per kg and respiratory rate of 20 per min; the rectal temperature was maintained between 36-37°C throughout the experiment. Lateral ventricular cannulation was carried out according to the method of Feldberg and Sherwood (2). Confirmation that the Collison's cannula was in the ventricles was obtained after injection of methylene blue and subsequent postmortem examination of brain. The cat was put on its belly and the head fixed in a head holder with the limbs outstretched. The diameter of the pupil at its greatest width was measured by a foot rule. A constant source of light was focused on the eyes of the cat to eliminate any changes in the diameter of the pupils due to changes in lighting conditions in the external environment. In another group of cats, the same experimental procedure was followed except bilateral adrenalectomy was done one hr before commencement of experiments.

Desiccated whole venom (Baringo Snake Farm, Nakuru, Kenya) was suitably weighed and dissolved in normal saline and injected into the lateral ventricle in a volume of 0.2 ml. Statistical analysis of data (paired 't' test) and the level of significance was determined at 95 per cent confidence limit, values of P greater than 0.05 were considered as not significant.

RESULTS

The results of lateral ventricular administration of 100 μ g snake venom are summarized in Table I. The onset of rise in blood pressure and heart rate after an average period of 11.7 ± 0.72 min was gradual and accompanied by dilatation of pupil, contraction of pilomotor muscles with erection of the hair over the back particularly maximum over the spinal column, twitching of ears and muscles of the limbs and back. The blood pressure and heart rate returned to normal levels after an average period of 96 ± 7.50 min.

TABLE I: Lateral ventricular administration of whole venom of *Dendroaspis polylepis* (100 μ g) and its effect on blood pressure and heart rate in normal cats.

N*	Latent period** (min)	Blood pressure (mmHg \pm SE)		Heart rate (beats per min \pm SE)		Pupillary size (mm \pm SE)		Incidence of survival****
		Normal	Increase after venom	Normal	Increase after venom	Normal	Increase after venom	
10	11.7 ± 0.72	114 ± 5.6	99.7 ± 8.8 ***	191 ± 11.5	50.5 ± 5.4 ***	2.5 ± 0.44	5.0 ± 0.64 ***	10/10

*N denotes number of cats used for the experiment.

** The time interval between intraventricular administration of snake venom and the onset of rise in blood pressure and heart rate.

*** These values are significantly different ($P < 0.05$) from the normal values (paired 't' test).

**** Number of cats survived/total number of cats tested.

In bilateral adrenalectomized cats ($N=6$) intraventricular administration of 100 μ g snake venom did not produce the rise in blood pressure and heart rate and in all experiments the cats did not survive after an average time of 29.9 ± 5.25 min.

DISCUSSION

The above results show that a small dose (100 μ g) of the whole venom of *Dendroaspis polylepis* produces an intense central sympathetic discharge. The increased sympathetic activity is indicated by the rise in blood pressure and heart rate, dilatation of pupils, twitching of the muscles and erection of the hair over the back particularly over the spinal column. Catecholamines have been shown to be released from adrenal medulla after stimulation of brain stem (5) and the hypothalamus (1,3). Bilateral adrenalectomy abolishes the hypertension and tachycardia

showing that release of catecholamines from adrenal medulla plays an important role in eliciting the cardiovascular response due to intense sympathetic stimulation.

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