

VASCULAR PERMEABILITY INCREASING ACTION OF THE SALINE EXTRACT OF
Dictyocaulus filaria — A PRELIMINARY REPORT

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Summary: The cutaneous hypersensitivity reaction in sheep infected with *Dictyocaulus filaria* was investigated. The saline extract of the worms increased the cutaneous capillary permeability in both the infected and uninfected control animals. Similar increase in the permeability was also observed in uninfected healthy rabbits. The results suggest that the vascular permeability increasing action of the worm extract is, partly, due to histamine release.

Key words: skin capillary permeability worm extract histamine release

INTRODUCTION

Cutaneous hypersensitivity reaction has been considered as a possible diagnostic test in various helminthic infections (2,4,7). This paper reports some studies on this reaction in sheep infected with *Dictyocaulus filaria*, a round worm found in the lungs and is commonly known as "lung worm".

MATERIALS AND METHODS

The saline extract of the worms was prepared by the method of Trawinski (9). For some experiments, the saline extract was dialysed for 48 hr in normal saline at 4°C. Experimental lambs each infected, 35 days earlier, with 2000 infective larvae were used (8). Evans Blue (5 mg/kg) was injected i.v. 30 min before the intradermal injections, in the prepared thigh region, of the worm extract or histamine. In some experiments, mepyramine maleate (10 mg/kg) was injected, i.m. 30 min prior to the intradermal injections. The increase in permeability was assessed (6) at 15 min 1/2, 1, 2 and 3 hr post-injection. Similar experiments were also done (5) in uninfected helminth-free rabbits.

To study its effect on the mast cells, the subcutaneous tissues of rats were exposed to the dialysed worm extract for 30 min and stained with 2% toluidine blue (3). Also, the dialysed worm extract (0.1-0.3 ml) was tested for its effect on the isolated guineapig ileum (1).

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RESULTS

The worm extract produced dose-dependent increase in the capillary permeability (Table I). Both the dialysed and undialysed samples were equally effective. The effects of 0.1 and 0.3 ml

TABLE I: Effect of the saline extract of *Dictyocaulus filaria* and histamine on cutaneous capillary permeability in sheep and rabbits.

Host	Substance injected	Dose	Number of observations	Intensity of reaction	
Uninfected sheep	Worm extract	0.1 ml	2	++	
		0.3 ml	2	+++	
	Histamine	1 μ g	2	++	
		3 μ g	4	+++	
Infected sheep	Worm extract	0.1 ml	4	++	
		0.3 ml	4	+++	
	Histamine	1 μ g	4	++	
		3 μ g	4	+++	
Mepyramine-treated sheep	Worm extract	0.1 ml	4	-ve	
		0.3 ml	4	-ve	
	Histamine	1 μ g	4	-ve	
		3 μ g	4	-ve	
Rabbits	Worm extract	0.1 ml	6	++	
		0.3 ml	6	+++	
	Dialysed worm extract	0.1 ml	6	++	
		0.3 ml	6	+++	
	Histamine	1 μ g	6	+	
		3 μ g	6	+++	
	Mepyramine-treated rabbits	Worm extract	0.1 ml	4	-ve
			0.3 ml	4	-ve
Histamine		1 μ g	4	-ve	
		3 μ g	4	-ve	

-ve = nil, + = mild, ++ = moderate, +++ = severe reactions.

of worm extracts were approximately equal to that of 1 and 3 μ g of histamine dihydrochloride. Histamine manifested its effect within 10-15 min but the worm extract did so in about 30 min. The effect of histamine as also of worm extract lasted for about 3 hr. Like histamine, the extract failed to induce an increase in the cutaneous capillary permeability in mepyramine-treated animals.

The mast cells exposed to the extract were found disrupted. However, the extract failed to contract the isolated guineapig ileum which was responding adequately to 50 ng of histamine dihydrochloride.

DISCUSSION

The cutaneous capillary permeability increasing action of the worm extract was completely blocked by the antihistaminic drug, mephyramine maleate. But the substance responsible for such an action is probably not histamine, as it did not induce contraction of the isolated guineapig ileum nor lost its action after dialysis. The mast cell degranulating action of the worm extract indicates that the vascular permeability increasing action of the extract is probably due to release of histamine at the site of injection. Further studies are underway to find out the nature of the substance and also the mechanism of its action.

It appears that the cutaneous hypersensitivity reaction in *D. filaria* infection in sheep may not provide a reliable test for routine diagnosis of this infection.

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