

## CHARACTERIZATION OF NORTHERN AND SOUTHERN ISOLATES OF TRICHINELLA IN IRAN,

J. MASSOUD, D.V.M., Ph.D.\* and M. MAHDAVI, M.SC.\*

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Caspian and Khuzestan, *Tatera indica*, Albino  
rat.

### ABSTRACT

Two isolates of Trichinella were obtained from the jackal, Canis aureus: one from the north Caspian area, the other from the south-west Khuzestan area of Iran. The infectivity of the isolates was tested in laboratory animals, in a wild rodent (Tatera indica) and in wild pigs. The isolate from Khuzestan was of low infectivity to albino rats and it was provisionally identified as Trichinella nelsoni. The Caspian isolate was highly infective for albino rats and wild pigs and was identified as Trichinella spiralis.

### INTRODUCTION

Recent investigations have shown that Trichinella is prevalent in wild carnivores in the Caspian, Isfahan and Khuzestan regions of Iran (7,10 and 6).

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\* School of Public Health and Institute of Public Health Research, PO Box 1310, Teheran University, Tehran, Iran.

Main natural reservoir is the golden jackal (Canis aureus). The question of speciation in the genus Trichinella is still debatable, but there were four sibling species: T. spiralis in temperate regions; T. nativa in the Arctic; T. nelsoni in southern Europe and the tropics, and T. pseudospiralis, an aberrant form from the USSR with no cysts, which infects both mammals and birds (2).

The main purpose of the present study was to investigate the degree of susceptibility of different rodents to Trichinella isolates from the northern and southern regions of Iran to see if different sibling species of Trichinella exist in this country.

## MATERIALS AND METHODS

The original isolates of Trichinella used in this study were from naturally infected golden jackals caught in north and south-west Iran, and subsequently maintained in laboratory albino mice. The wild rodents and wild pigs used in the experiments were caught in the Khuzestan area of Iran. Rodents were given varying doses of larvae from 100 to 10,000 each; the larvae were obtained by the digestion method. Sixty days post infection, the entire body of the rodents (after skinning and grinding) was digested in a polythene flask, containing digestive fluid (1% pepsin and 1% HCl). The total number of larvae and also the number per gram of muscle was calculated separately for each animal. Two young wild pigs caught in the Dezful area of Khuzestan were anaesthetised with nembutal and

given 50,000 and 25,000 Trichinella larvae of a northern (Caspian) isolate by stomach tube. At autopsy 20 grams of flesh from different parts of the body was digested and the number of larvae calculated per gram of tissue.

## RESULTS

### INFECTIVITY IN RODENTS

A comparison of the infectivity of the different isolates was made by exposing mice, rats, hamsters, rabbits and wild Tatera indica to varying doses of larvae. The number of larvae recovered at 60 days post infection with the Caspian isolate in albino laboratory rats varied from 1720-400 per gram with a mean of 2350 larvae per gram, i.e. a productivity rate of 73%. The corresponding figures for the Khuzestan isolate in albino rats were 0-209 with a mean of 50 larvae per gram, i.e. a productivity rate of 2.3%. The differences between the means are highly significant ( $p < 0.001$ ). The results obtained in albino-rat agree with observations of other workers who have shown that tropical strains of Trichinella have a much lower infectivity than temperate strains in albino rats. In other rodents: albino mice, Tatera indica (a wild rat) and hamsters, the infectivity of the two isolates of Trichinella were more or less similar (Table 1).

The Mortality in animals infected with the Caspian isolate is shown in Table 2. The highest mortality was seen in the hamster. Among the rats, Tatera indica was the most susceptible, and a dose of 4000 larvae was

invariably fatal, whereas the laboratory albino rats were more resistant and some survived infecting doses as high as 6000. The Khuzestan isolate is still of very low infectivity to albino rats after four years of laboratory passage in mice.

The Caspian isolate was shown to be highly infective to wild pigs. The distribution of larvae in different parts of the body was not uniform: the tongue, masseter and diaphragm muscles demonstrated the highest number of larvae per gram. The mean larval densities per gram of muscle increased from 364 to 950 as the number of inoculated larvae increased from 25,000 to 50,000. A number of larvae were recovered from the tail by digestion. The localisation of larvae in the tail muscle of pigs is thought to be important in domestic pigs because of transmission of infection through the tail chewing habits of pigs in crowded pigsties.

Samples of Trichinella from the Caspian and Khuzestan areas were sent to Professor Boew in Alma-Ata, USSR, for identification by the genetic method; he identified the Khuzestan sample as Trichinella nelsoni and the Caspian sample as Trichinella spiralis.

## DISCUSSION

Variations in the infectivity of different strains of Trichinella to laboratory rodents and pigs, was first reported from Kenya(4,9,and 8)distinct differences between tropical, temperate and arctic isolates of Trichinella

were demonstrated(8). The question of speciation in the genus Trichinella was raised in 1972(3) and more recently, (2). It was concluded that there are four sibling species in the genus. Our data indicate that two foci of Trichinella occur in Iran and they are provisionally designated as T. spiralis for the northern and T. nelsoni for the southern forms. The infectivity of T. nelsoni has not changed during numerous passages in the laboratory animals and it is still of low infectivity for the albino rat. This is in contrast to the findings(1) that the infectivity of T. pseudospiralis increased during adaptive passages in different laboratory animals and(5) the demonstration of complete adaptation of a West African Trichinella to pigs after three passages through rats<sup>(5)</sup>

Although our findings show that there are distinct differences in the biological properties of different isolates of Trichinella in Iran, further characterisation of the parasites will be necessary using genetic and isoenzyme techniques before there can be confidence in the specific identifications.

Table 1. Susceptibility of different species of rodents to Trichinella larvae isolated from 2 different geographical regions of Iran

Rodent species	Caspian isolate			Khuzestan isolate		
	No. of animals	Mean No. larvae fed	Mean No. larvae recovered/gram of muscle	No. of animals used	Mean No. larvae fed	Mean No. larvae recovered/gram of muscle
Albino-Rats	28	2350	1720	28	2000	50
Albino-mice	35	520	1000	21	750	2346
Hamster	9	375	1250	5	500	500
<u>Tatera indica</u>	11	937	2940	5	3000	2390
Rabbits	6	5330	370	6	5000	395

Table 2. Results of different dosages of Trichinella larvae from Caspian region given to various species of rodents

Number of larvae	Mean Number of Larvae in Total Muscle Diges 1000					
	Albino mice	Hamster	Albino rat	<u>Tatera indica</u>	Rabbit	Guinea pig
100	12	-	-	-	-	-
250	35	40	9	200	-	-
500	39	87	94	365	-	-
1000	33	dead	104	400	-	-
2000	dead	dead	145	1000	105	1000
4000	-	-	280	dead	200	dead
6000	-	-	400	dead	280	dead
8000	-	-	-	-	500	-
9000	-	-	-	-	504	-
10000	-	-	-	-	dead	-

Live animals were killed 60 days after infection ...

Table 3. Distribution of larvae of *T. spiralis* (caspien isolate) in different parts of body at 60 days post infection, in experimentally infected wild pigs.

Muscle	50,000 larvae inoculated	2500 larvae inoculated
	No. of larvae/gram	No. of larvae/gram
Tongue	1800	170
Masseter	1600	670
Diaphragm	1300	560
Biceps	480	50
Deltoide	660	210
Vastus lateralis	520	110
Intercostal	480	70
Lumbo dorsal	390	270
Tail	70(total)	5(total)
Mean	950	364



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