

SEROLOGICAL INVESTIGATION ON HUMAN TRICHINELLOSIS SPIRALIS IN HUBEI PROVINCE OF PR CHINA

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Abstract. PVC-ELISA for detection of human trichinellosis and its value of field application was explored during 1988-1994. Sera of 56 cases of clinically confirmed trichinellosis were tested for serum *Trichinella* antibodies by way of PVC-ELISA, and the positive rate was 100%. When the sera of 80 cases of healthy persons from non-endemic areas were tested for trichinellosis, they were all negative. For the purpose of exploring the cross-reaction of PVC-ELISA used for detection of trichinellosis, sera from 144 cases of other parasitoses were tested. Among them, the sera of 80 cases of schistosomiasis japonica for trichinellosis were negative; 30 cases of paragonimiasis and 30 cases of clonorchiasis were also negative. Among sera of 4 cases of cysticercosis, there was only one positive. The results showed that PVC-ELISA for trichinellosis had a high sensitivity and specificity. For field application, a population of 800 from endemic areas were examined by PVC-ELISA, 85 (10.63%) were positive. The infected persons were mainly in Xiangfan region of Hubei Province. The percentage of the positive of trichinellosis in Xiangfan region was 64.71% (55/85). The positive rate of males and females was 13.41% (57/425) and 7.47% (28/375), respectively. There was a difference among the age groups, with the highest in those ≥ 20 years. The findings of this field investigation suggested that the infection rate of trichinellosis spiralis was high in this province, especially in the Xiangfan region; and that PVC-ELISA was suitable for field application. The emphasis of trichinellosis control and research of this province should be in the Xiangfan region.

INTRODUCTION

Trichinellosis spiralis is a zoonosis and in some regions of China, the infection rates in pigs and humans tends to be increasing. Detection rates in pigs have reached 2-7% in some regions of China. Nanyang city of Henan Province reported *Trichinella* infection rates in pigs of ~ 50% (Yu et al, 1986). The first case of human trichinellosis was reported in 1965 and outbreak have occurred many times in Tibet, Yunnan, Henan and Hubei Province, etc (Xu, 1984). Xiangfan region of Hubei Province is a high prevalence area and several outbreaks of trichinellosis have occurred since 1985 (Chen et al, 1990).

To determine the situation of trichinellosis spiralis and to provide information concerning control in this province, we explored the sensitivity, specificity and field application of PVC-ELISA (polyvinyl chloride-ELISA). An epidemiological investigation was conducted in eight prefectures and cities of this province.

MATERIALS AND METHODS

Serum samples: (1) 100 blood were collected from each of sampled populations of eight prefectures and cities. Sera were centrifuged, refrigerated at -20°C ; (2) 56 serum samples were also obtained from clinically-confirmed trichinellosis patients; (3) 80 sera from schistosomiasis patients were collected from endemic areas of schistosomiasis japonica; (4) 30 blood samples were collected from paragonimiasis patients; (5) 30 blood samples were collected from clonorchiasis patients; (6) 4 blood samples were collected from cysticercosis patients; (7) 80 blood samples from healthy persons from non-endemic areas.

Antigen: Soluble larva antigen of *Trichinella spiralis* was adhered to disposable polyvinyl chloride membranous plates (PVC membranous plate). Some PVC membranous plates were from the Institute of Parasitic Diseases of Sichuan Province, and some from Economic Developing Region of Science And Technology of Donghu, Wuhan city.

Conjugate: Horse radish peroxidase-anti-human IgG McAb was prepared with a working concentration 1:200-400.

Substrate: 3, 3', 5', 5' - Tetramethylbenzidine (TNB) supplied by the Institute of Parasitic Diseases of Sichuan Province.

Procedure in test: It was similar to routine ELISA, but simpler. It took only 5 minute for bathing without water at a temperature of 30 °C. The whole test could be finished within half an hour. The result were observed with the naked eyes. PVC plates were inoculated with 10 µl diluted 1:20 (Chen *et al.*, 1990).

Judgement of result: The results were judged against positive reference sera and negative reference sera and graded from - to ++. Only those that remained positive after a confirmation test were determined as positive.

RESULTS

Sensitivity and specificity: All sera from the 56 clinically diagnosed trichinellosis patients were positive, a positive rate of 100%; the sera of 80 schistosomiasis patients, 30 paragonimiasis patients and 30 clonorchiasis patients were negative. There was one cross-reaction positive in the sera of the four cysticercosis patients. All the sera of 80 healthy persons from the non-endemic area were negative.

Field study: The population of 800 in eight prefectures and cities revealed 85 positives given a positive

rate of 10.63%. The population with trichinellosis spiralis was mainly distributed in Xiangfan region, with 55 cases of the total 85 cases as indicated in Table 1.

Table 1

Number and positive rate of human trichinellosis serum antibody in different prefectures and cities.

Prefecture or city	No. positive (%)
Wuhan	9 (9.0)
Xiangfan	55 (55.0)
Yichang	7 (7.0)
Enshi	5 (5.0)
Huangshi	2 (2.0)
Xianning	1 (1.0)
Huanggang	2 (2.0)
Jingsha	4 (4.0)
Total	85 (10.63)

Note : Total number of persons examined was 100 in each prefecture and city.

The positive rates in the males and females were 13.41% (57/425) and 7.47% (28/375), respectively. There was a significant difference of positive rates between male and female ($X^2 = 7.47$, $p < 0.01$). The results of serum *trichinella* antibodies at different age groups are given in Table 2.

Of groups with different occupations the trichinosis serum antibody positive rate was highest in officials and the second highest in peasants (Table 3).

Table 2

Age distribution of *Trichinella spiralis* infections.

Prefecture or city	No. of persons with positive antibody/persons exam						Total
	10-19	20-29	30-39	40-49	50-59	60+	
Wuhan	0/5	2/25	3/41	2/19	2/10	-	9/100
Xiangfan	1/9	13/31	39/52	2/8	-	-	55/100
Yichang	1/32	1/15	0/5	2/27	3/21	-	7/100
Enshi	-	1/29	2/40	0/3	1/11	1/17	5/100
Huangshi	0/11	0/30	1/51	-	1/8	-	2/100
Xianning	0/21	0/42	-	1/24	0/13	-	1/100
Huanggang	-	0/17	1/39	1/44	-	-	2/100
Jingsha	-	2/21	1/42	0/14	1/23	-	4/100
Total	2/78	19/210	47/270	8/139	8/86	1/17	85/800

Table 3

Occupational distribution of *Trichinella spiralis*.

Occupation	No. examined	No. positive (%)
Student	78	2 (2.56)
Peasant	310	45 (14.52)
Factory worker	247	9 (3.64)
Cadre	165	29 (17.58)
Total	800	85 (10.63)

DISCUSSION

Infections in people in our province were not previously known due to lack of a systematic survey. This broad-range serological survey on trichinellosis in the population produced basic information of the infections and their distribution in our province, providing useful guidance for trichinellosis control.

PVC-ELISA for trichinellosis showed good sensitivity and field application. Sera were tested from 56 diagnosed trichinellosis patients and 80 healthy persons from nonendemic areas and also the sera from 144 patients with other parasitoses. The test showed a high sensitivity, strong specificity, was rapid, simple and suitable for applied field work. A population of 800 was investigated and 85 persons were found positive with an average infection rate of 10.6%. (Li, 1985; 1990). These patients lived mainly in the counties of the north of the Yangtze River in Xiangfan city. There were fewer positive cases in the other prefectures and cities. The peasants and local residents in Xiangfan region had some bad habits of turning pigs out into the fields to graze and feed, eating raw, poorly cooked or rare meat foods and cooked meat foods. The life style and cooking habits of the local residents may be the main cause of the high trichinellosis infections in Xiangfan region.

On the basis of age distribution of trichinellosis positive cases in all the prefectures and cities involved, the population positive rate of four age groups 20-29, 30-39, 40-49 and 50-59 was higher than others. In terms of occupational distribution, the official and peasant groups had higher positive rates. There was a significant difference in the positive rates of trichinellosis serum antibody between males and females ($X^2 = 7.41$,

$p < 0.01$). This positive rate was not due to difference in susceptibility to *Trichinella* due to different age, occupation or sex, but to whether or not they had eaten raw under-cooked pork containing living infectious larvae of *Trichinella spiralis*, ie humans generally contract *Trichinella spiralis* by consuming undercooked pork (Fu *et al*, 1991; Xu *et al*, 1984). In any region with high infection rate of *Trichinella spiralis*, local residents have bad habits of eating rare sliced pork or rare pork-stuffed dumpling. There was a steady increase in populations who ate instant-boiled pork slice, roasted or fried pork strings and ham and sausage made of pork in recent years and accordingly an increase in people infected with *Trichinella spiralis*. Cadres, especially leading cadres had more opportunities to eat together and therefore more chance of eating in restaurants, so the infection rates were high in this group because the meat they ate in restaurants were often instantly fried. With economic development, the increasing need for labor force in enterprise of cities and counties and towns has made the males in rural areas more mobile and increased the chance of eating outside and increased the risk of infection. This was the cause for high infection rates in the cadres, peasants and the male laborers. The target groups for control should be peasants, cadres, male workers, especially those who left home to do odd jobs in townships at the county level, towns during slack farming seasons. Local residents should conduct health propaganda, promoting non-eating of raw or rare pork foods, not using utensils for cutting raw meat and cooked meat, advocating the raising of pigs in a pen, eliminating reservoir hosts of rats, etc, strengthening the quarantine of pork, strengthening management and monitoring food hygiene of union meat processing factory and restaurants.

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