EPIDEMIOLOGY OF SWINE TRICHINELLOSIS IN CHINA

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Summary :

Swine trichinellosis has been reported in 26 provinces, autonomous regions or municipalities (P/A/M) of China. The prevalence rate in swine varied from 0.12 % to 34.2 % in five P/A/M, from 0.01 % to 0.0001 % in other P/A/M. The seroepidemiological survey of swine trichinellosis was carried out by ELISA in seven P/A/M, the seroprevalence varied from 0.09 % to 29.63 %. The prevalence of *Trichinella* infection in pork sold at the market was from 0.29 % to 5.6 % in four provinces. The transmission of trichinellosis by garbage is the main features of epidemiology of swine trichinellosis in China. Rat is an important reservoir in the domestic cycle of trichinellosis. The prevalence rates of *T. spiralis* infection in rats were from 1.98 % to 15.06 % in six provinces or autonomous regions. The treatment prophylaxis with forage contained albendazole has been applied to the control of swine trichinellosis in Nanyang area of Henan province, the prevalence of swine trichinellosis had decreased from 32.2 % before prophylaxis to 0.12 % after prophylaxis.

KEY WORDS : trichinellosis, *Trichinella spiralis*, epidemiology, swine, rat, China.

Trichinellosis is still a serious zoonosis which is widely distributed in China. Pork is the main source of *Trichinella* infection for humans in China (Wang *et al.*, 1998). Moreover, the data on the nationwide prevalence of swine trichinellosis were rare in China. Hence, the aim of our work is a review of swine trichinellosis in China. It is based on the publications on epidemiology of swine trichinellosis in China. The materials were systematized and analyzed respectively for trichinellosis of swine and rat in this paper.

EPIDEMIOLOGICAL DATA

PREVALENCE OF SWINE TRICHINELLOSIS

Swine trichinellosis was reported in 26 P/A/M of China. Five provinces belonged to the high endemic areas where the prevalence was more than 0.1 % (Table I). Nine P/A/M belonged to the low endemic areas, where the prevalence varied from 0.0001 % to 0.0897 % (Table II). The prevalence of swine trichinellosis detected in abattoirs of the other eight P/A/M in 1982 was 0.007 % in Gansu, 0.006 % in Ningxia, 0.001 % in Xinjiang, 0.001 % in Guizhou, 0.003 % in Guangxi, 0.04 % in Shanxi, 0.026 % in Nei-Mongol, and 0.002 % in Jiangsu (Zhu, 1993). In addition, swine trichinellosis was recorded in Zhejiang, Fujian and Xizang.

SEROPREVALENCE OF SWINE TRICHINELLOSIS

The seroepidemiological survey of swine trichinellosis was carried out by indirect ELISA in seven provinces or municipalities of China (Table III). The ELISA method was performed as described before (Li *et al.*, 1991). The mean O.D. value of negative sera from 135 healthy pigs was 0.12. The positive cutoff was determined to be four times of the mean of negative sera. The seroprevalence was from 0.09 % to 19.89 %.

Location	Year	No. examined	No. infected	% infected	Reference
Liaoning	1980	685 418	232	0.34	Li, 1980
Heilongjiang	1998	1 878 874	2 274	0.12	Jia <i>et al.</i> , 1998
Hubei	1987	1 539 768	33 550	2.18	Xu & Cao, 1987
	1997	290 294	19 637	6.76	Xu & Cao, 1997
Henan	1986	3 630	1 243	34.20	Wu <i>et al.</i> , 1986
Yunnan	1991	15 515	157	1.00	Yang, 1991
	1999	4 314 000	1 329	0.31	Qian <i>et al.</i> , 1999

Table I. – Prevalence of trichinellosis in pigs slaughtered in abattoirs by five microscopic examination in five provinces.

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Location	Year	No. examined	No. infected	% infected	Reference
Jilin	1982	1 644 700	24	0.0015	Zhu, 1993
Beijing	1982	2 322 300	25	0.0011	Zhu, 1993
Tianjing	1982	1 270 200	14	0.0011	Zhu, 1993
Shangdong	1993	69 460 962	7 116	0.0102	Lu <i>et al.</i> , 1993
Shaanxi	1982	251 340	11	0.0044	Zhu, 1993
Anhui	1982	2 406 200	198	0.0082	Zhu, 1993
Hunan	1982	2 782 700	3	0.0001	Zhu, 1993
Sichun	1999	6 687	6	0.0897	Jia & Yin, 1999
Guangdong	1982	1 568 900	2	0.0001	Zhu, 1993

Table II. – Prevalence of trichinellosis with low level of infestation in nine provinces by microscopic examination in pigs slaughtered in abattoirs.

Location	Year	No. examined	No. infected	% infected	Reference
Beijing	1991	1 062	1	0.09	Ji <i>et al.</i> , 1991
Liaoning	1991	623	14	2.25	Wang <i>et al.</i> , 1991
Heilongjiang	1998	365	38	10.41	Song <i>et al.</i> , 1998
Henan	1989	47 031	8 927	19.89	Zhang <i>et al.</i> , 1989
Hubei	1987	1 459	24	1.64	Tong & Li, 1987
Hunan	1989	550	94	17.1	Fan & Liu, 1989
Yunnan	1999	320	20	8.70	Qian <i>et al.</i> , 1999

Table III. – Seroprevalence of swine trichinellosis in China by indirect ELISA.

PREVALENCE OF *TRICHINELLA* IN PORK SOLD AT THE MARKET

The custom of unauthorized, domestic slaughtering without veterinary controls has been handed down from generation to generation in China, especially in rural areas. Thus, the prevalence of *Trichinella* infection in pork sold at the market in China was high. From 1985 to 1998, prevalence of *Trichinella* infection in pork sold at the market was investigated by direct microscopic examination in several provinces of China.

The results showed that the prevalence of *Trichinella* in pork varied from 0.29 % to 5.6 % (Table IV).

PREVALENCE OF RAT TRICHINELLOSIS

Since the prevalence of swine trichinellosis was considered to be well correlated to the prevalence of rat trichinellosis, the epidemiological survey of rat trichinellosis was also carried out by direct microscopic examination and artificial digestion method in six provinces. The prevalence of *T. spiralis* infection in rats varied from 1.98 % to 15.06 % (Table V).

Location	Year	No. examined	No. infected	% infected	Reference
Yunnan	1985	254	2	0.80	Zhang, 1985
Henan	1997	75 821	324	4.27	Wang <i>et al.</i> , 1997
Gangsu	1997	684	2	0.29	Zang <i>et al.</i> , 1997
Hubei	1998	12 374	693	5.60	Ye <i>et al.</i> , 1998

Table IV. – Prevalence of *Trichinella* infection in pork sold at the market in China.

Location	Year	No. examined	No. infected	% infected	Reference
Fujian	1939	136	3	2.21	Tang, 1939
Henan	1986	347	18	5.19	Wu <i>et al.</i> , 1986
Hubei	1987	332	50	15.06	Yi <i>et al.</i> , 1987
	1998	2 667	279	10.46	Ye <i>et al.</i> , 1998
Yunnan	1985	130	4	3.08	Yang, 1985
	1991	362	27	1.98	Yang, 1991
Xizang	1975	45	2	4.44	Zheng <i>et al.</i> , 1975
Guangxi	1995	19	1	5.26	Gan <i>et al.</i> , 1995

Table V. – Prevalence of rat trichinellosis in China.

CONTROL OF SWINE TRICHINELLOSIS

Although the policy that pigs are slaughtered and quarantined for trichinellosis in abattoirs was carried out in China since 1996, it is difficult to examine all pigs for diagnosis of trichinellosis, especially in rural areas with home slaughtering. Therefore, treatment-prophylaxis was applied to the control of swine trichinellosis in some endemic areas. The pigs were fed with forage containing albendazole for 3-4 months, the prevalence of swine trichinellosis decreased from 32.2 % before prophylaxis to 0.12 % after prophylaxis in Nanyang area of Henan province.

TRANSMISSION OF SWINE TRICHINELLOSIS

Since the *T. spiralis* larvae were found in pork for the first time in 1881 in China, it has been considered that the domestic pig is the most important element of the domestic cycle of trichinellosis. Swine trichinellosis in China was mainly transmitted by garbage (ie. feeding pigs with uncooked pork scraps). Although there are some large pig farms, most of pigs are mainly raised by individual farmer in China. Many Chinese farmers have the habit of feeding pigs with raw garbage or pasturing pigs outdoors, so pig can easily eat the garbage which contains the living *Trichinella* larvae. A survey showed that all of 10,252 pigs raised in Menglou area of Hubei province were freely foraged without piggery (Yi *et al.*, 1987).

There is no specific domestic *Trichinella* strain capable to infect domestic pigs only or a *Trichinella* strain adapted to wild animals only. This nematode can easily be transferred from domestic pigs to wild animals. Rat is an important reservoir in the domestic cycle of trichinellosis in China. The prevalence of rat trichinellosis was also high in some areas of China where the prevalence in swine was high. Thus, the high prevalence of swine trichinellosis is to be attributed to the possible ingestion of rats, which are often parasitized by *T. spiralis* (Yi *et al.*, 1987). Hence, in order to eradicate swine trichinellosis, the traditional pig-rearing mode should be changed, all pigs should be raised in piggery and all garbage must be boiled for 30 minutes before being fed to pigs so that the *Trichinella* larvae contained in the garbage can be completely killed. In addition, the possibility of the transfer of infection from rats to pigs must be considered for the control of swine trichinellosis.

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