# PREVALENCE OF INTESTINAL HELMINTHIASIS IN KERMANSHAH CITY AND SOME VILLAGES IN THE PROVINCE*

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ABSTRACT **Inhabitants of 4 districts in the city of Kermanshah, the capital of Kermanshahan province, living under various socio-economic conditions, were examined for infection with intestinal helminthiasis. Two of these districts were close to and the other two far from a small stream running through the city and serving as an unsanitary sewage system.**

**A total of 889 persons in different sex and age groups from these 4 areas and 57 students of a nursing school in the city were examined.**

**In addition, a total of 933 inhabitants of 10 villages, 5 in the vicinity of Kermanshah city and 5 in the Qasr-e-Shirin area in the western part of the province, were also examined.**

**A surprisingly high prevalence of infection with Ascaris and Trichuris was found among the inhabitants of all 4 districts, the mean prevalence being 74% for Ascaris and 64% for Trichuris. The prevalence of Trichostrongylus spp. and H. Nana was less than 7%**

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**in all areas. The prevalence of Ascaris and Trichuris did not differ very much in the various sex and age groups except in the age group below 5, which had lower infection rates.**

**The prevalence of these two infections was similarly high among the inhabitants of the villages (a mean infection rate of 78% for Ascaris and 58% for Trichuris). The highest rate of infection with trichostrongyliasis was 19% found in the village of Ghaleh Sabzi near Qasr-e-Shirin city**

**The species of Trichostrongylus expelled from treated patients were T. colubrifromis, T. vitrinus T. capricola. Species found in animals were T. vitrinus, T. colubriform, T. axei and T. capricola .**

**The factors responsible for the high rate of infection among the population of the city are discussed .**

## INTRODUCTION

The high prevalence of human infection with various intestinal helminths has previously been reported from many rural parts of Iran.(1) These infections are usually low among the inhabitants of cities, except for Isfahan where a high prevalence of infection with Ascaris, Trichuris and Trichostrongylus spp. was reported by Ghadirian *et al.* in 1968.

A survey undertaken among the population of several districts in the city of Kermanshah has revealed a surprisingly high prevalence of infection with Ascaris and Trichuris. The results obtained from this study in the city of Kermanshah and some villages in the province are presented in this paper.

## MATERIALS AND METHODS

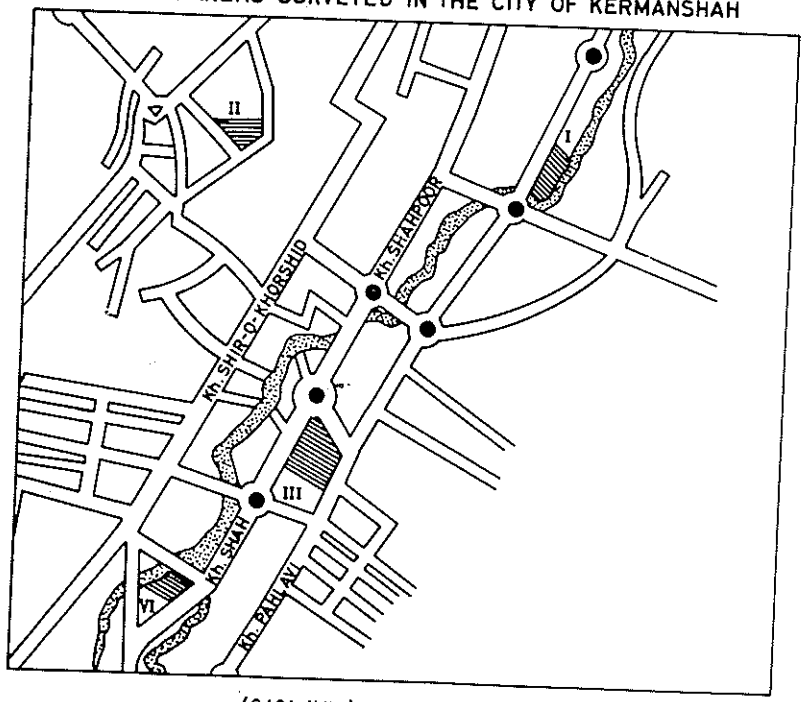
The city of Kermanshah, with a population of about 300,000, is the capital of the province (ostan) of Kermanshahan in the western part of Iran. This city is very old with a hilly structure. The sewage system of the city consists of a small stream called Abshouran which runs through the city from the southwest to the northeast and which contains sewage from houses, including latrine effluents (Map 1). This unsanitary condition is due mainly to the type of soil, which makes the use of latrine pits difficult.

In order to determine the variation in the prevalence of infection with intestinal helminthiasis in this city, 4 districts were chosen for the survey as follows (Map 1):

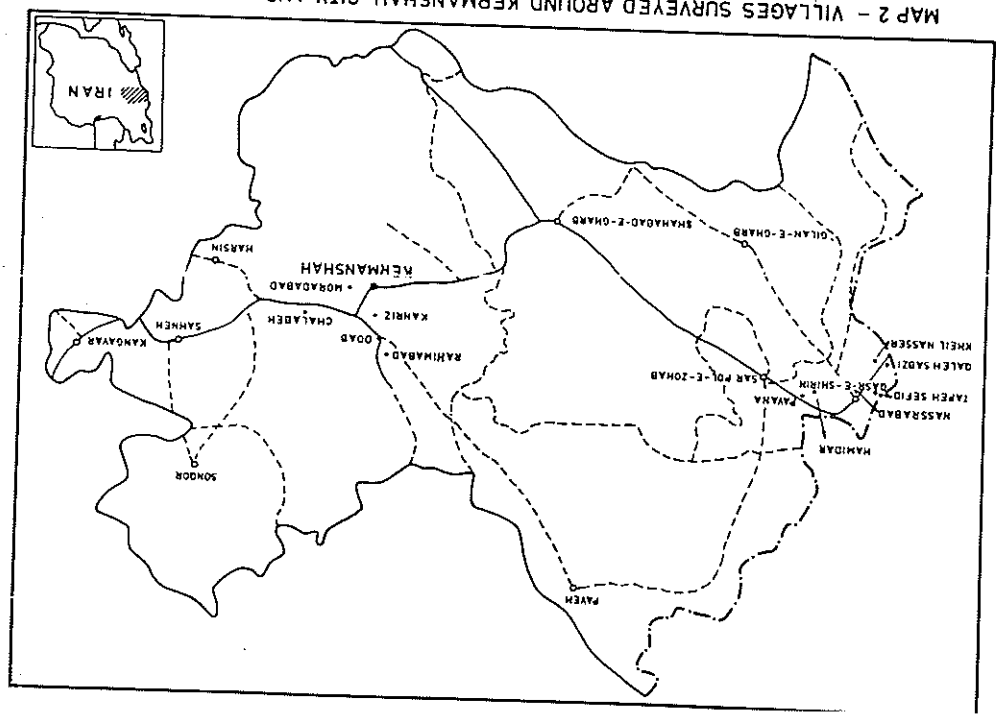
1. An area in the northeastern part of the city close to the Abshouran open sewage stream, where the population is of

MAP 1

FOUR AREAS SURVEYED IN THE CITY OF KERMANSHAH




MAP 2 - VILLAGES SURVEYED AROUND KERMANSHAH CITY AND IN QASR-E-SHIRIN AREA (MAY 1973)



the low socio-economic level;

2. An area far from this stream in the northwestern part of the city inhabited by people of low income;

3. An area in the south far from the sewage stream with a high socio-economic population; and

4. An area in the southwest close to the stream but with a population of high socio-economic level.

In addition, 57 students of a nursing school with a high standard of sanitation were examined.

Stool samples were collected from all members of every other house in each area and examined for prevalence using flotation method and for intensity of infection by the Stoll method (for 50% of samples positive with Ascaris).

Some samples of vegetables served in restaurants and some purchased and ready for consumption by the nursing students were also examined for the ova of helminths.

To determine the condition of helminthiasis in the rural areas, 5 villages in the vicinity of Kermanshah city and 5 villages in the Qasr-e-Shirin area, 120 km west of Kermanshah, were visited and the inhabitants examined using the same methods mentioned above. Of 5 villages surveyed in the vicinity of the city, two (Kahriz and Morad-Abad) were near the sewage stream coming from the city and 3 were far from this stream.

To identify the species of Trichostrongylus found in this part of the country, 5 infected persons from the city of Kermanshah and 25 from the rural areas were treated with 20 mg/kg Pyrantel Pamoate in a single dose. All worms expelled were collected and identified. To determine the species of Trichostrongylus in domestic animals, the first part of the intestine of 91 sheep, 61 goats and 18 cows was examined and the worms were collected and identified.

## RESULTS

*City of Kermanshah and surrounding villages*:

The prevalences of intestinal helminthiases among the inhabitants of 4 districts in Kermanshah and among the students of a nursing school are shown in Table 1. As indicated in this table, the prevalence of Ascaris and Trichuris among the populations of all areas is very high but only a few people are infected with Trichostrongylus spp. In addition, a very low percentage of people were found infected with *T. saginata* and Oxyuris.

The prevalences of infection with Ascaris and Trichuris in various age groups for the 4 areas in Kermanshah and 5 villages in its vicinity are shown in Table 2. As shown in this table, the

prevalence of both Ascaris and Trichuris infection is very high among all age groups except in the age groups 0-4 and over 60 with 40% and 25% respectively for Ascaris and 21% in age group 0-4 for Trichuris.

The results of a quantitative examination of stools from inhabitants of the 4 districts and from all villages surveyed in its vicinity and in Qasr-e-Shirin, are set out in Table 3. The species of Trichostrongylus found in man in Kermanshah were *T. colubriformis* and *T. orientalis*.

*Qasr-e-Shirin area*:

In Table 4, the prevalences of infection with various intestinal helminthiases among the inhabitants of 5 villages surveyed in Qasr-e-Shirin are shown.

Table 5 shows the variation in the prevalence of infection among the two sexes in villages in the Kermanshah and Qasr-e-Shirin areas.

*Species of Trichostrongylus found*:

The species of Trichostrongylus collected from patients after treatment were *T. colubriformis* and *T. orientalis* in Kermanshah and *T. colubriformis, T. vitrinus* and *T. capricola* in the Qasr-e-Shirin area. The species found among animals were as follows: *T. vitrinus, T. colubriformis, T. axei* and *T. capricola*.

The mean number of Ascaris expelled by each of 22 out of 25 patients treated was 14. The minimum was 3 and the maximum 41. Ascaris ova were found on the surface of radishes which were ready for consumption by students of the nursing school.

## DISCUSSION

The high prevalence of infection with Ascaris and Trichuris found among the inhabitants of the city of Kermanshah is of great interest. Such a high prevalence of infection in a city has so far been found only in Isfahan,[2] but even there the prevalence of both parasites is not so high.

Preliminary investigations to determine the reason for such high infection rates have indicated that the main reason is the lack of a proper sewage system in the city and the unsanitary habits of the population.

The small stream which runs through the city (Map 1) is used as a sewage system by emptying the effluent of latrines into it. Water from the same stream is used for the cultivation of vegetable farms outside the city. The contamination of vegetables, which is one of the main items of food of the population, is probably the most important source of infection for the inhabitants.

As an example, the high prevalence of infection with the two parasites among students of the nursing school, who are living under sanitary conditions, might be due to the contamination of fresh vegetables consumed by them as a part of their diet.

The high infection rate with Ascaris among the inhabitants of villages can not be attributed to the contamination of the Abshouran stream, since the prevalence of this infection does not differ very much between the populations of the two villages near the stream and those far from it.

The very low infection of the population with Trichostrongylus might be attributed to the zoonotic aspect of this parasite and the lack of contact of the population of the city with domestic animals. However, this cannot be the only explanation, since the prevalence of infection with this parasite was very low in all villages surveyed except one. The population of this village mainly used animal dung for heating purposes. In this regard, it should be mentioned here that *T. orientalis*, which infects man mainly in areas where human prevalence with trichostrongyliasis is high, was not found in Kermanshah and neighboring villages.

Finally, the surprisingly high prevalence of infection of the population of the city and villages in this part of the country with Ascaris and Trichuris and the severe clinical manifestations reported by many physicians in the city, should prompt the health authorities of this country to begin immediate action on the following:

1. longer and more intensive studies on the epidemiology of these parasites in the city and villages;
2. the establishment of a sanitary sewage system and possibly a sewage treatment plant; and
3. a pilot project for the control of helminthiasis in order to assess different methods of control and then launch more extensive attempts at the control of helminthiasis in this province.

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REFERENCES

1. Arfaa, F. (1972). Present status of helminthiasis in Iran. Trop. Geog. Med. *24*:353-362.
2. Ghadirian, E., Bijan, H. and Sabokbar, R. (1968). Particularites de l'epidemiologie de l'ascaridose et accessoirement de celles de la Trichostrongylose et de la Trichocephalose dans la ville d'Isphahan, Iran Bull. Soc. Path. Exot. *61*(6): 879-885.

TABLE 1

Prevalence of various intestinal helminths in different parts of Kermanshah city, May 1973

| Area | Sex | No. Exam. | Percent Positive with: | | | |
|---|---|---|---|---|---|---|
| | | | A.l. | T.t. | Tr. | H. nana |
| Region I | M | 103 | 82 | 73 | 0 | 5.8 |
| near sewage and | F | 106 | 83 | 72 | 5 | 4. |
| low income | T | 209 | 82 | 72 | 2 | 5. |
| Region II | M | 116 | 70 | 68 | 0 | 4. |
| far from sewage | F | 99 | 86 | 80 | 3 | 4. |
| and low income | T | 215 | 77 | 73 | 2 | 4. |
| Region III | M | 101 | 68 | 59 | 3 | 0 |
| far from sewage | F | 103 | 69 | 57 | 3 | 0 |
| and high income | T | 204 | 67 | 58 | 3 | 2. |
| Region IV | M | 98 | 80 | 53 | 2 | 2. |
| near sewage and | F | 106 | 59 | 63 | 2 | 3. |
| high income | T | 204 | 65 | 58 | 2 | 2. |
| Students of nursing school | F | 57 | 67 | 32 | 0 | 7. |
| TOTAL | | 889 | 74 | 64 | 2 | 4. |

A.l. = Ascaris lumbricoides

T.t. = Trichuris trichiura

Tr. = Trichostrongylus spp.

TABLE 2

Prevalence of Ascaris and Trichuris among various age groups of the inhabitants of Kermanshah city and 5 villages in its vicinity (May 1973)

| Age Group | Kermanshah City | | | Villages near the city | | |
|---|---|---|---|---|---|---|
| | No. Exam. | % Infected with: | | No. Exam. | % Infected with: | |
| | | Ascaris | Trichuris | | Ascaris | Trichuris |
| Below 5 | 82 | 40 | 21 | 76 | 49 | 26 |
| 5-9 | 139 | 66 | 67 | 66 | 86 | 73 |
| 10-14 | 141 | 82 | 69 | 62 | 95 | 71 |
| 15-19 | 133 | 80 | 65 | 37 | 89 | 78 |
| 20-39 | 239 | 82 | 68 | 78 | 91 | 79 |
| 40-59 | 122 | 74 | 74 | 46 | 98 | 70 |
| 60 + | 33 | 25 | 58 | 16 | 88 | 56 |
| TOTAL | 889 | 74 | 64 | 381 | 83 | 64 |

TABLE 3

Minimum, maximum and mean number of eggs of Ascaris and Trichuris per gram of faeces found in various areas of Kermanshah and all villages (May 1973)

| Areas Surveyed | Eggs/gr of faeces | | | | | |
|---|---|---|---|---|---|---|
| | Ascaris | | | Trichuris | | |
| | Max. | Min. | Mean | Max. | Min. | Mean |
| Kermanshah Region I | 20,400 | 700 | 7311 | 1400 | 200 | 277 |
| " II | 38,300 | 400 | 11551 | 2400 | 200 | 626 |
| " III | 14,400 | 400 | 5246 | 1000 | 200 | 194 |
| " IV | 35,400 | 400 | 9670 | 1600 | 200 | 373 |
| TOTAL | 38,300 | 400 | 8445 | 2400 | 2000 | 368 |
| Villages in vicinity of the city | 35,600 | 200 | 7724 | 3200 | 200 | 416 |
| Villages in Qasr-e-Shirin | 42,800 | 400 | 8134 | 1200 | 200 | 666 |

TABLE 4

Prevalence of various helminths in different villages surveyed in the vicinity of Kermanshah city and in Qasr-e-Shirin (May 1973)

| | Name of Village | No. Exam. | Prevalence of Infection with: | | | |
|---|---|---|---|---|---|---|
| | | | Ascaris | Trichuris | Trichos. | H. nana |
| Kermanshah | 1. Morad Abad | 73 | 82 | 84 | 6 | 4 |
| | 2. Kahriz | 89 | 85 | 51 | 1 | 6 |
| | 3. Rahim Abad | 70 | 77 | 63 | 0 | 3 |
| | 4. Do Abe | 53 | 85 | 57 | 2 | 8 |
| | 5. Chal Abad | 96 | 84 | 57 | 0 | 8 |
| Qasr-e-Shirin | 1. Ghaleh Sabzi | 131 | 73 | 53 | 19 | 14 |
| | 2. Tapeh Sefid | 57 | 68 | 49 | 1 | 1 |
| | 3. Nassir Abad | 119 | 64 | 37 | 5 | 13 |
| | 4. Pavena | 127 | 84 | 68 | 2 | 6 |
| | 5. Hinder | 118 | 79 | 58 | 3 | 10 |
| TOTAL | | 933 | 78 | 58 | 5 | 9 |

TABLE 5

Prevalence of Ascaris, Trichuris and Trichostrongylus spp. according to sex among inhabitants of villages of Kermanshah and Qasr-e-Shirin (May 1973)

| Areas | Sex | No. Exam. | Percent Infected with: | | |
|---|---|---|---|---|---|
| | | | Ascaris | Trichuris | Trichos. |
| Villages in Kermanshah | M | 215 | 79 | 64 | 1 |
| | F | 166 | 88 | 64 | 1 |
| | T | 381 | 83 | 64 | 1 |
| Villages in Qasr-e-Shirin | M | 297 | 72 | 54 | 5 |
| | F | 255 | 77 | 53 | 11 |
| | T | 552 | 74 | 54 | 8 |
| TOTAL | M | 512 | 75 | 58 | 9 |
| | F | 421 | 81 | 58 | 8 |
| | T | 933 | 78 | 58 | 9 |